1997-03

Evaluation of the inventory and accountability practices of common support equipment throughout Pacific and Atlantic Fleets

McCallister, Frank F; McCallister, Joyce L.; Pridgen, Robert D.

Monterey, California. Naval Postgraduate School

NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

EVALUATION OF THE INVENTORY AND ACCOUNTABILITY PRACTICES OF COMMON SUPPORT EQUIPMENT THROUGHOUT PACIFIC AND ATLANTIC FLEETS

by

Frank F. McCallister
Joyce L. McCallister
Robert D. Pridgen

March, 1997

Thesis Advisors: Donald R. Eaton
James G. Taylor
Gordon R. Nakagawa

Approved for public release; distribution is unlimited.

DUDLEY KNOX LIBRARY
NAVAL POSTGRADUATE SCHOOL
MONTEREY CA 93943-5101

REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE 14 March 1997	3. REPORT TYPE AND DATES COVERED Masters Thesis

4. TITLE EVALUATION OF THE INVENTORY AND ACCOUNTABILITY PRACTICES OF COMMON SUPPORT EQUIPMENT THROUGHOUT PACIFIC AND ATLANTIC FLEETS

5. FUNDING NUMBERS

6. AUTHOR(S) Frank F. McCallister, Joyce L. McCallister, Robert D. Pridgen

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Naval Postgraduate School
Monterey CA 93943-5000

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT *(maximum 200 words)*

Within Naval Aviation, Common Support Equipment (CSE) plays a critical yet unglamorous role in maintaining aircraft material readiness. Defense of CSE dollars is difficult because the output of Aviation Support Equipment is not measurable. The ability to quantify and defend that role has been the nemesis of the Aviation Support Equipment Integrated Program Team members over the past two budget cycles.

This study's intent is to provide an argument in defense of adequate program funding. The premise of this argument is: Inventory validity is a major consideration in making sound investment decisions. If the Fleet SE inventory validity is within acceptable limits, then the Fleet's input into the re-capitalization decision support system is valid. If the Fleet's SE inventory validity is poor, then the Fleet's buyout input is suspect. The foundation of this research is to determine how accurately the Fleet's on-hand assets are reflected in the automated inventory database used to manage those assets.

This research concludes that the mean SE validity for a reporting custodian's Intermediate Maintenance Activity (IMA) or Organizational Maintenance Activity (OMA) account is 72.4%. Fleet Individual Material Readiness List (IMRL) inventory control processes are hampered by a lack of quantifiable metrics, duplicative and conflicting inventory control methods, and lack of a single source directive detailing inventory procedures. Failure to control these processes degrades the IMRL decision support system, hampers re-capitalization decisions, and inhibits the ability to determine how SE - or the lack thereof – impacts aircraft material readiness.

14. SUBJECT TERMS Support Equipment, Inventory Validity, LAMS, SERMIS, AMMRL Program.			15. NUMBER OF PAGES 145
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL

Approved for public release; distribution is unlimited.

EVALUATION OF THE INVENTORY AND ACCOUNTABILITY PRACTICES OF COMMON SUPPORT EQUIPMENT THROUGHOUT PACIFIC AND ATLANTIC FLEETS

Frank F. McCallister
Major, United States Marine Corps
B.S., United States Naval Academy, 1981
Joyce L. McCallister
Major, United States Marine Corps
B.S., United States Naval Academy, 1982
Robert D. Pridgen
Captain, United States Marine Corps
B.S., United States Naval Academy, 1988

Submitted in partial fulfillment
of the requirements for the degrees of

MASTER OF SCIENCE IN SYSTEMS MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
March 1997

ABSTRACT

Within Naval Aviation, Common Support Equipment (CSE) plays a critical yet unglamorous role in maintaining aircraft material readiness. Defense of CSE dollars is difficult because the output of Aviation Support Equipment is not measurable. The ability to quantify and defend that role has been the nemesis of the Aviation Support Equipment Integrated Program Team members over the past two budget cycles.

This study's intent is to provide an argument in defense of adequate program funding. The premise of this argument is: Inventory validity is a major consideration in making sound investment decisions. If the Fleet SE inventory validity is within acceptable limits, then the Fleet's input into the re-capitalization decision support system is valid. If the Fleet's SE inventory validity is poor, then the Fleet's buyout input is suspect. The foundation of this research is to determine how accurately the Fleet's on-hand assets reflect in the automated inventory database used to manage those assets.

This research concludes that the mean SE validity for a reporting custodian's Intermediate Maintenance Activity (IMA) or Organizational Maintenance Activity (OMA) account is 72.4%. Fleet Individual Material Readiness List (IMRL) inventory control processes are hampered by a lack of quantifiable metrics, duplicative and conflicting inventory control methods, and lack of a single source directive detailing inventory procedures. Failure to control these processes degrades the IMRL decision support system, hampers re-capitalization decisions, and inhibits the ability to determine how SE – or the lack thereof– impacts aircraft material readiness.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

ADP	Automated Data Processing
AIR	Activity Inventory Record
AIRLANT	Commander Naval Air Force U.S. Atlantic Fleet
AIRPAC	Commander Naval Air Force U.S. Pacific Fleet
AMMRL	Aircraft Maintenance Material Readiness List
APU	Aircraft Power Unit
ATR	Automated Transaction Reporting
AUTOSERD	Automated Support Equipment Recommendation Data
CAGE	Commercial And Government Entity (Code)
CFA	Cognizant Field Activity
CMC	Commandant of the Marine Corps
CNARF	Commander Naval Air Reserve Forces U.S.
CNATRA	Chief of Naval Air Training
CNO	Chief of Naval Operations
COG	Cognizance Symbol
COMNAVAIRLANT	Commander Naval Air Force U.S. Atlantic Fleet
COMNAVAIRPAC	Commander Naval Air Force U.S. Pacific Fleet
COMNAVAIRRESFOR	Commander Naval Air Reserve Force
COMNAVAIRSYSCOM	Commander Naval Air Systems Command
CSE	Common Support Equipment
DBM	Data Base Management
DBMS	Data Base Management System
Depot	Naval Aviation Depot Rework Facility
DOD	Department of Defense
DMC	Defense MegaCenter
EI	End Item
ES	Executive Summary
FY	Fiscal Year
ICP	Inventory Control Point
IMA	Intermediate Maintenance Activity
IMRL	Individual Material Readiness List
JAX	Jacksonville, Florida
LAMS	Local Asset Management System

MALS	Marine Aviation Logistics Squadron
MARFORLANT	Marine Forces Atlantic
MARFORPAC	Marine Forces Pacific
MCAS	Marine Corps Air Station
MMF	Mobile Maintenance Facility
MOS	Military Occupational Specialty
NADEP	Naval Aviation Depot
NADOC	Naval Aviation Depot Operations Center
NAEC	Naval Air Engineering Center
NAMO	Naval Aviation Maintenance Office
NAMP	Naval Aviation Maintenance Program
NAMTRAGRU	Naval Air Maintenance Training Group
NAVAIR	Naval Air Systems Command
NAVAIRENGCEN	Naval Air Engineering Center
NAVAIRSYSCOM	Naval Air Systems Command
NAVAVNLOGCEN	Naval Aviation Logistics Center
NAVAVNMAINTOFF	Naval Aviation Maintenance Office
NAVCOMTELSTA	Naval Computer and Telecommunications Station
NAVICP	Naval Inventory Control Point
NAWC(AD)	Naval Air Warfare Center (Aircraft Division)
NAWC(WD)	Naval Air Warfare Center (Weapons Division)
NCTS	Naval Computer and Telecommunications Station
NEC	Navy Expert Code
NIIN	National Item Identification Number
NOLA	New Orleans, Louisiana
OMA	Organizational Maintenance Activity
PCR	Program Change Request
PIR	Program Investigation Request
PMA	Program Management Activity
PSE	Peculiar Support Equipment
PSECA	Primary Support Equipment Controlling Authority
SE	Support Equipment
SECA	Support Equipment Controlling Authority
SECNAV	Secretary of the Navy
SERD	Support Equipment Recommendation Data
SERMIS	Support Equipment Resources Management Information System
SMR	Source Maintenance & Recoverability (Code)
SODARR	Source Data Revision Recommendation
SOP	Standard Operating Procedures

SSDR	SERMIS Source Data Review
TR	(SE) Transaction Report
TYCOM	Type Commander

ACKNOWLEDGEMENT

The authors would like to acknowledge the financial support of COMNAVAIRSYSCOM Code PMA-260 for paying for the travel to collect the background information and data.. Additional acknowledgment is given to CNO Code N88, NAWC(AD), and COMNAVAIRPAC Code N422 for their "expert" and "responsive" assistance in completing this thesis. We are deeply appreciative to all of these commands who never said "no" and are extremely dedicated to supporting the Fleet. And thank you to Lt. Col. Jim Griffin, USMC for bringing us all together.

In the case of Frank and Joyce McCallister, we would like to acknowledge the patience of our loving children Brendan, Conlan, and Clancy while completing this thesis.

In the case of Robert Pridgen, I am deeply grateful for the infinite patience and understanding of my bride, Tamla, and my wonderful children Katie and Cary.

I. INTRODUCTION

A. PURPOSE

The Common Support Equipment (CSE) budget has been reduced by more than 27% over the past two years [Ref. 1]. Unfortunately no rationale or methodology (neither quantitative nor qualitative) is available to DoD managers and commanders to either argue against further reductions or even assess input of such budgetary cutbacks. However operators intuitively know (based on their past operating experience) that such reductions in CSE do ultimately adversely affect fleet readiness. CSE budgets should not be reduced such that national security is jeopardized. This study is intended to provide an initial basis of analysis for defense against further reductions in CSE funding.

The ability to defend the CSE budget has been hampered by a lack of direct demonstrable correlation between the CSE inventory validity and documented aircraft material readiness. Our research will compare inventory validity of squadron and intermediate maintenance activity support equipment (SE) accounts to aircraft material readiness data to determine if there is a correlation.

Additionally, our research will look at the impact SE inventory validity has on the decision support system used when replacing existing CSE systems. The correlation between inventory validity and Fleet CSE requirements, as documented through the Appropriation, Navy 7 (APN-7) CSE compilation of a prioritized buyout list, is unknown. This uncertainty limits program manager's confidence in the validity of buyout decisions and undermines prospects for proper budget justification.

It is our assumption that inventory validity is a major consideration in the complicated process of making good investment decisions. If the Fleet's inventory validity is within acceptable limits then the Fleet's buyout requests are valid. If validity is poor then the Fleet's buyout input to the APN-7 Buyout Conference is suspect.

B. WHAT IS SUPPORT EQUIPMENT ?

"What is support equipment? Think of all that it takes to operate, service and maintain your car....everything from specialized wrenches to sophisticated engine analyzers.... Now imagine that instead of driving a $20,000 sedan in a city full of repair shops, you're driving a $40 million F/A-18 off a 1,000 foot long, 90,000 ton ship, often isolated from a logistical support chain. The quantity and complexity of equipment needed to support this vehicle increases almost as rapidly as the cost of the vehicle itself."[Ref. 2]

SE is required to make an aeronautical system, command and control system, support system, subsystem, or end-item of equipment operational. SE includes all equipment required to launch, arrest, guide, control, direct, inspect, test, adjust, calibrate, gauge, measure, assemble, disassemble, handle, transport, safeguard, store, actuate, service, repair, overhaul, maintain, or operate a system, subsystem, end-item, or component. It consists of tools, special condition monitoring equipment, diagnostic and checkout equipment, metrology and calibration equipment, maintenance stands, and servicing and handling equipment required to support scheduled and unscheduled maintenance actions associated with a system. Figure 1 is a picture of an F/A-18 aircraft surrounded by a portion of CSE required for its support.

Figure 1. F/A-18 with some Common Support Equipment [Ref. 2]

C. HOW MUCH SUPPORT EQUIPMENT DOES NAVAL AVIATION MANAGE?

As of 1 October 1996, the Navy reported that 1039 activities had support equipment in inventory totaling $5.378 billion. This accounts for more than 800,000 pieces of SE. [Ref. 3]

D. WHY IS NAVY/MARINE CORPS SE SPECIAL?

What's so special about Navy(/Marine Corps) SE? Operating at sea, aboard a small moving crowded ship imposes severe requirements on the design of Navy(/Marine Corps) SE. Space limitations force the SE to be used close to other powerful electronic equipment such as radar systems requiring that the SE satisfy exacting electromagnetic interference and compatibility standards. There is nothing more corrosive than a hot, wet, salty environment, exactly what the SE is subjected to in a majority of forward deployed areas. Cold weather operations hinder maintenance efforts, degrade SE effectiveness and decrease the effective lifetime. The SE must satisfy rigorous shock and vibration standards. Electrical requirements are unusually stringent as are fire prevention standards. And above all else, this equipment must have a small footprint, be able to operate on a rolling and pitching flight deck moving at thirty knots, be extremely reliable and, if it breaks; be repairable by a 19 year old seaman/marine, who is working through another arduous 12 hour shift.[Ref. 2]

E. WHAT ARE THE MANDATES FOR SE INVENTORY CONTROL MANAGERS?

SE management strives to strike a careful balance between institutional pressures to maintain program funding (external) and programmatic pressures to efficiently employ that funding (internal). The challenges they face are an outgrowth of current DoD initiatives that center around *streamlining* as technology and the cost of weapon systems escalate at an exponential rate. The current state of affairs is best summarized by the Honorable Paul G. Kaminski, Under Secretary of Defense for Acquisition and Technology:

> Within our department, our war fighters have come to clearly realize that DoD finances are a zero sum game, that every logistics dollar expended on outdated systems, inefficient or excess organic capability and unneeded inventory is a dollar not available to build, modernize, or maintain war fighting capability. They also realize that the logistics slice of the defense budget is large by any measure – consuming about 50% of the DoD budget. [Ref. 4:pg. 4]

The "zero-sum" game referred to by Mr. Kaminski has a significant impact on SE which accounts for inventory levels greater than 800,000 end items worth $5.4 billion. Unlike the Cold War days, SE managers will have to approach each decision with a "cost verses benefit" or "best value" methodology. This proposal presents an overarching strategic objective of maintaining SE levels sufficient to preserve the nation's war fighting capability with the major challenge of affordability. Zero-sum also means that what logistics gains, war fighters give up. It means in a sense the same as "constant- sum."

In order to accomplish their objectives, SE managers must change the underlying culture that has embodied the entire DoD logistic system. In simplified terms, the DoD logistic system (including SE) is characterized as a "just-in-case" system. It has lots of "just-in-case" inventory which has significant ramifications. In addition to buying this $5.4 billion inventory, we must pay to store, issue, manage, and dispose of it as well [Ref.4:pg. 4]. This is not to say that "just-in-time" inventory practices, used by commercial enterprises, would fulfill requirements for SE management. The shortcomings of a "just in time" system, given the scope of naval expeditionary warfare, are obvious and not suggested as a possible future course of action. As stated by Mr. Kaminski:

> Neither the "just-in-case" nor the "just-in-time" system are right for the Defense Department. A tailored approach is needed. Right now, the pendulum is too close to "just-in-case". It needs to swing more to a "just-in-time" position.... It also means we must have the information system to provide total asset visibility. [Ref. 4: pg. 5]

This presents a unique challenge to change the embedded culture while maintaining sufficient quantities of SE to meet the Fleet's needs. Due to the expeditionary nature of Naval aviation, a significant amount of built-in inventory redundancy is required to support the myriad of missions of a globally deployed force. However, decisions on the

proper inventory requirements need to be made from a strategic vice operational vantage point. SE managers have made great strides to facilitate this decision making process with the institution of the support equipment resources management information system (SERMIS) as a decision support system. SERMIS and the "closed-looped" theory it embodies provide total asset visibility that is in keeping with current DoD mandates and serve as the foundation upon which all SE strategic decision support is based.

F. HOW IS NAVAL AVIATION SE CATEGORIZED AND MANAGED?

There are two major categories of support equipment - common and peculiar. CSE is intended to be used by several types of aircraft or systems, e.g., ground electrical, pneumatic, and hydraulic power units; towing, hoisting, and fueling devices; and voltage, amperage, and phase measuring devices. Commander, Naval Air Systems Command (COMNAVAIRSYSCOM) code Program Management Activity (PMA)-260 has total responsibility for research, engineering, design, development, test and evaluation, acquisition, production, logistics support, life cycle management, upgrade, transition, and disposal of CSE. Peculiar Support Equipment (PSE) is designed and developed in conjunction with the development of a specific weapon system and is generally applicable to only one system, subsystem, or end-item. PSE management is the responsibility of the program office under which the supported system is acquired. [Ref. 5: para. 2.1]

G. WHY DO WE HAVE CSE AND NOT JUST PSE?

It is to the Fleet's advantage to maximize the use of CSE because fewer pieces of SE are required overall. Less SE requires less space, fewer maintainers and is less costly. During the development of a new aircraft system, aircraft manufacturers determine the initial SE requirements. It is to their advantage to recommend peculiar SE in order to generate more revenue from development and production of increased requirements. Naval Air Warfare Center (Aircraft Division) [NAWC (AD)] serves as the "honest broker" and reviews the recommendations for PSE to determine if the Navy/Marine Corps can substitute or modify items already available. Aircraft program managers stand to save significant amounts in the life cycle costs of their program when CSE is substituted for

contractor proposed PSE. NAWC(AD)'s goal is to avoid procuring unneeded contractor-recommended support equipment such as the unnecessary expenditures of $929,681.00 spent on SE for the SEAHAWK helicopter and TOMCAT aircraft. [Ref. 6: Abstract]

H. WHO IS RESPONSIBLE FOR THE POLICES AND PROCESSES IN THE MANAGEMENT OF SE?

Concurrently with the management of all aspects of CSE, PMA-260 also has prime authority over the SE program, Aircraft Maintenance Material Readiness List (AMMRL) Program. The authority and foundation for the AMMRL Program is derived from the Naval Aviation Maintenance Program (NAMP) as the sole program providing information required for the effective management of in-use support equipment, CSE and PSE, at all levels of aircraft maintenance. Under this authority, PMA-260 issues and enforces the processes and policies under which all participants in the SE business operate. [Ref. 7: para. 3]

I. WHAT IS THE SE MANAGEMENT PROGRAM?

The AMMRL Program sets policy and procedures for all Navy and Marine Corps activities managing NAVAIR and other cognizant field activity (CFA) approved SE required for the three levels of aircraft maintenance. [Ref. 7: par. 4] The program provides visibility to include excess/deficit calculations used by support equipment managers at all levels to establish and improve activity readiness. The objectives of the AMMRL Program follow:

- To determine and establish allowance requirements for SE at activities performing organizational, intermediate or depot level maintenance.
- To provide standard inventory control procedures.
- To assist in redistribution of in-use assets.
- To provide a base for budgeting requirements.
- To assist in measuring material readiness.[Ref. 7: par.5]

J. IDIOSYNCRASIES OF THE AMMRL PROGRAM WHICH ARE KEY TO UNDERSTANDING THE OBJECTIVES OF THIS RESEARCH

The following AMMRL Program idiosyncrasies are important to understand within the context of this thesis. They are not all encompassing [Ref. 8: par. 1]:

- The AMMRL Program Manager, PMA-260, is responsible to achieve the objectives of the AMMRL Program.
- AMMRL Program SE shall be subject to formal SE allowance computation, inventory management, accounting, distribution and transaction reporting procedures.
- At a minimum, annual physical inventories will be conducted.
- The majority of in-use SE assets are controlled by the Support Equipment Controlling Authorities (SECAs) of which there are five, e.g., Commander, Naval Air Force, Pacific.
- The Support Equipment Resources Management Information System (SERMIS) is the sole automated source of in-use SE asset information used by the SECAs when determining equipment allowances and excess/deficit status. SERMIS provides allowance and inventory data as well as depot level rework tracking of each activity's total aviation SE assets.
- The Local Asset Management System (LAMS) is a software program that provides a standardized method of managing aviation SE assets within an activity. The LAMS is the sole automated system used by an organizational or intermediate level maintenance activity reporting custodians to manage SE inventories. LAMS standardizes inventory control procedures for an activity's SE account known as the activity's Individual Material Readiness List (IMRL) assets. LAMS provides printed reports for all levels of management and provides automated input of inventory transactions to SERMIS.
- SECAs conduct frequent reviews of their respective SE asset inventories against allowances and provide redistribution/disposition instructions for assets excess to an activity's allowance. Conversely, SECAs, seeking to satisfy deficit

SE requirements, review their respective asset posture and that of other SECAs to locate assets potentially in excess of another activity's allowance. When requirements cannot be satisfied by available excesses or if no excesses exist, the requiring SECA refers the question to the Primary SECA, COMNAVAIRSYSCOM code PMA-260C3.

- The SECA is the only authority that can tailor an IMRL account above the authorized level. All IMRL account managers can request, through their SECA, to tailor their list down from the authorized amount. In order to gain approval for a tailor down, the request must be reviewed by the equipment managers of the systems requiring that specific piece of SE.
- APN-7 Buyout Process. The Aviation SE Management Board (ASEMBO) is an annual prioritization conference held in January at NAVICP Philadelphia, PA. Conference membership includes the SECAs, NAVAIRSYSCOM, NAVICP Philadelphia, NAVICP Mechanicsburg, and NAWC(AD) SE managers. Conference results are in a "final" list which is then analyzed by PMA-260 and converted into an "executable" buy-list that is eventually ratified by the TYCOMs. This executable buy-list will be different from the prioritized list because it takes into account "easy-to-execute" actions like contract options or simple procurements. Once the list is ratified, OPNAV N-88 issues an operational requirements document recognizing the list as "the SE requirement". OPNAV N-88 budgets to satisfy the list, and a line is drawn across the list where the allocated funding runs out. The items left un-funded are referred to as "below-the-line items" which PMA-260 places on future year program objective memorandums (POMs).
- The ASEMBO accepts CINC's, TYCOM's and SECA's SE priorities and matches them with available APN-7 funding in order to consolidate SE procurement efforts. The TYCOMs/SECAs facilitate this process by drawing down a SERMIS run and identifying deficiencies. Since SERMIS inventory validity mirrors LAMS (user) input, the APN-7 executable buy-list is heavily

reliant on LAMS validity. Therefore, LAMS validity is the linchpin that holds this process together and is critical in determining APN-7 funding priorities. The crucial dependence of the top level SE management decision strategies upon the validity of the LAMS is the original motivation for focusing this thesis on LAMS' inventory validity. The physical inventory/LAMS/SERMIS relationship is illustrated below in Figure 2.

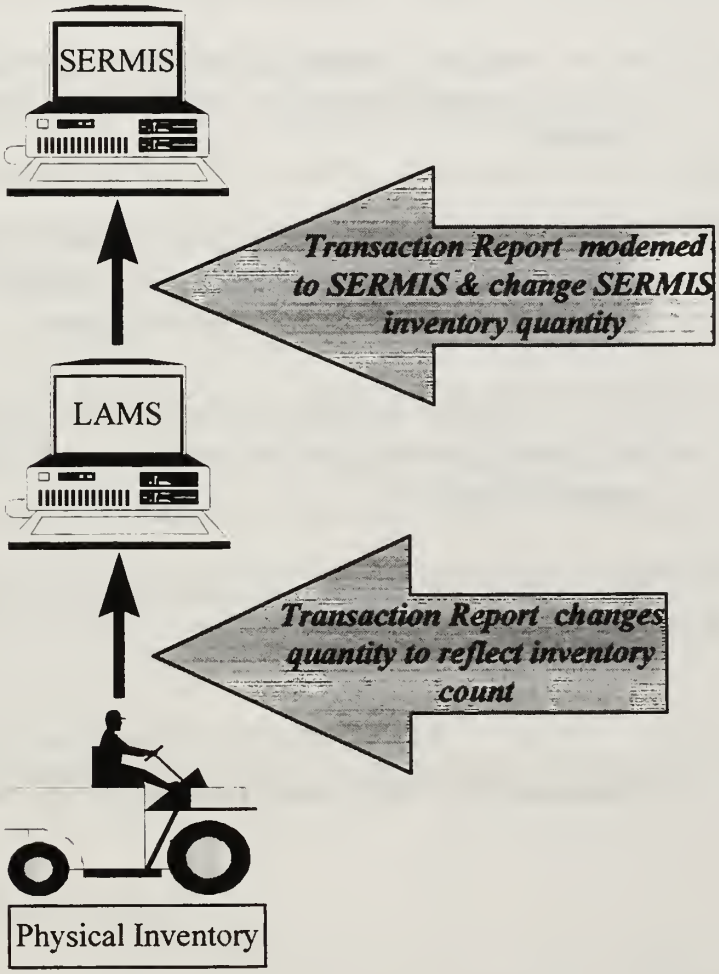


Figure 2. LAMS to SERMIS Relationships [Developed by Researchers]

K. THIS THESIS IS ATTEMPTING TO ANSWER THE FOLLOWING QUESTIONS?

1. Primary Research Question:

What is the validity of IMRL inventories throughout PAC Fleet units and is there a correlation between validity and aircraft material readiness?

2. Subsidiary Research Questions:

a) What is the validity of IMRL inventory records in the user's inventory record keeping data base (LAMS - Local Asset Manager's System)?

b) How accurately do the LAMS records reflect in the re-capitalization decision makers data base (SERMIS - Support Equipment Resources Management Information System)?

c) Are either the Navy's or Marine Corps' practices more efficient or effective over the other Service? Is there a relationship to aircraft material readiness?

d) Do the Fleet's SE inventory practices comply with Naval instructions?

e) How effectively are Fleet Aviation Specialized Operational (FASO) Schools educating IMRL managers?

II. HISTORY AND METHODOLOGY

A. CHAPTER INTRODUCTION

"Good inventory control is good inventory control, regardless of the industry" [Ref. 9: pg. 267]. Our interest was peaked on the state of SE inventory control by a story about Auxiliary Power Unit (APU) Shipboard Engine Test Adapters made by Allied Signal, Garrett Auxiliary Power Division (part numbers 298082-5 and 297329-1). Seventeen APU adapters were procured and delivered to the Fleet at an approximate cost of $300,000.00 per unit. The item is used in conjunction with the shipboard T-1 Engine Test System to allow testing of the GTC36-200 APU. Today there are *not* enough assets available to satisfy the requirement for one per ship (total of twelve), and the shrinkage in assets is unexplainable. The Fleet is now in a situation where they need to cross-deck from one ship to another in order to deploy with full capability. Cost quotes to reprocure this item in a limited quantity of one or two are approximately $800,000.00 per unit [Ref. 10]. Stories like the APU Shipboard Test Adapters and an eight year old Naval Audit Service audit on SE management sparked our interest on the state of the Fleet's SE inventory. Before looking at current SE inventory matters this chapter recaps the history of SE inventory validity, describes the AMMRL inventory management relationships and outlines the thesis research methodology.

B. THE HISTORY OF SE INVENTORY VALIDITY DATING BACK TO 1989

1. Statistically Speaking

The Naval Audit Service performed an audit on the management of the support equipment program during the period 12 November 1986 through 9 September 1988 [Ref. 6]. Audit objectives included but were not limited to the accuracy of SERMIS as it relates to the physical inventory of IMRL SE assets. The auditors conducted physical inventories on a statistical sample of IMRL assets at 21 IMA's and then, compared the

results of the physical inventories to recorded inventory information in SERMIS. Of the 8646 National Item Identification Numbers (NIINs) applicable at the 21 IMAs, a stratified random sample of 262 NIINs were reviewed. The auditors stated, "We believe conditions found at those 21 IMAs are representative of what might be found at other activities controlling IMRL assets" and "the audit was conducted in accordance with generally accepted Government auditing standards" [Ref. 6: pg. 4]. Table 1 is a summary of results from this audit.

	NIINs	Pieces of Equipment
Total actual variances	100	523
Comprised of Overstatements	56	251
Understatements	62	272
Total projected variances [1]	4,026	21,862
Comprised of Overstatements[2]	1,775	6,099
Understatements	2,862	16,369

Table 1.Naval Audit Summary [Ref.6]

The Naval Audit Service results concluded that the information in SERMIS was inaccurate because of a lack of management and control. The statistical review at 21 IMAs showed a 90 percent probability that there were 4,026 (±732) IMRL line items with variation between actual and recorded on-hand quantities in SERMIS. They also found 3,166 pieces of equipment, unrelated to the sample, which were unrecorded.

> Although some errors were inexplicable, the variances were primarily caused by failure to maintain proper control and accountability over assets, untimely reporting of gains and losses, errors in updating the data base, and lack of training. [Ref. 6: pg. 5]

[1] Projections are based on 90 percent probability and show the mid-point of the statistical range.
[2] The sum of projected over and understatements does not equal total projected variances because of statistical imprecision.

The findings of Audit Report 028-C-89 stated,

> [D]uring the last 20 years, Naval Audit Service reports have cited ... inaccurate inventory records and inadequate inventory procedures.... As a result, the quantity of assets recorded in the SERMIS is inaccurate, potentially affecting safety, readiness, and mission capability of supported weapon systems. Procurement, placement, and distribution decisions were also affected....The Naval Audit Service has addressed deficiencies in support equipment management in numerous single activity audit reports since 1968, and in a Service-wide audit in 1973. Most deficiencies found in previous audits are similar enough to those disclosed in this review to conclude that corrective actions were ineffective. Specifically our audit showed that inventory information is inaccurate. There is a 90 percent probability that on-hand quantities reported in SERMIS are incorrect for more than one of every three prime NIINs at the activities we reviewed. [Ref. 6: pg. 8]

The review concluded that inventories were not conducted properly. The method of conducting inventories did not ensure that all support equipment was identified and accountable. Instead of conducting a wall-to-wall inventory by listing all support equipment that could be found at the activity, comparing that list with the recorded inventory in SERMIS and the IMRL then reconciling differences, the inventory teams looked only for assets recorded on local records. The procedure resulted in unrecorded assets being found only by chance and, therefore, resulted in an incomplete reconciliation process [Ref. 6: pg. 14].

2. Historical Recommendations

Naval Audit 028-C-89 made 36 recommendations concerning all aspects of SE management. Again this thesis is focusing only on those issues affecting inventory validity.

a) Recommendation (a)

One of the Naval Audit's recommendations suggested the CNO coordinate a Navy-wide wall-to-wall physical inventory of IMRL SE to establish an accurate baseline

inventory for SERMIS [Ref. 6: pg.15]. All concurred [Ref. 6: pg.16] and the CNO letter [Ref. 11] directed the wall-to-wall inventory.

b) Recommendation (b)

Once an accurate baseline is established, the audit recommended the CNO enforce the requirement that an annual wall-to-wall inventory be conducted. All concurred. [Ref. 6: pg.15-16]

c) Recommendation (c)

The Audit recommended that the CNO enforce the requirement to report support equipment gains, losses, and transfers properly [Ref. 6: pg. 16]. All concurred. [Ref. 6: pg. 18]

d) Recommendation (d)

The Audit recommended that the CNO ensure that using/reporting activities verify the accuracy of input to SERMIS at the controlling authority level. [Ref. 6: pg. 16] The writers of this thesis interpret this recommendation to mean, at least in part, that SERMIS records were not reflecting LAMS records. There needed to be a means to reconcile and correct SERMIS records to reflect LAMS records and vice-a-versa. All concurred with the recommendation. [Ref. 6: pg.18]

e) Recommendation (e)

The Audit recommended the CNO enforce the requirement that using activities properly report excesses. They also recommended that using activities validate SERMIS computed excesses in conjunction with the physical inventory. All concurred. [Ref. 6: pg. 21-22]

f) Recommendation (f)

The Audit stated,

> A relatively low priority was placed on the IMRL support equipment function in terms of personnel. Although IMRL managers

typically were well qualified, trained, and highly motivated their workforce was comprised of temporary personnel who were usually reassigned before becoming fully knowledgeable. All but 1 of 21 IMRL managers had attended the IMRL managers course or had other qualifications for performing the function. However, only 32 of 72 personnel assigned to assist IMRL managers had similar qualifications. In addition, routine transfer of military personnel can create disruption when they are IMRL managers. By the time the IMRL manager becomes familiar with the operation, equipment, and peculiarities of an activity, and thus becomes fully productive, transfer occurs. Because there is no Navy Enlisted Classification or Military Occupational Specialty for IMRL, the transferring activity may not receive an experienced replacement. Further, the gaining activity might not place the individual in the IMRL section." The audit recommended, "Civilianizing the IMRL manager position wherever possible, e.g., non-deployable units, or creating an IMRL classification and specialty code for situations where civilianizing is impractical would solve the problems of continuity and expertise. [Ref. 6: pg.14-15]

Commandant of the Marine Corps' response to the recommendation included the statement that,

> Civilianization of the IMRL manager position whenever possible, e.g., non-deployable activities, will not be a cost effective solution. Again the procedures are not complicated and civilians will not be trained any better as managers than are military personnel. It would, without a doubt, take more civilians to do the job than it takes Marines. Given present manning in the Fleet and at Marine Corps Air Stations, IMRL management is not a full time job – if done right. Perhaps the biggest reason for not establishing a specific specialist is the lack of anything special or complicated in the management of IMRL assets at the user level. There is nothing complicated about the IMRL management process. Once basic knowledge of the mechanics of processing IMRL transactions is acquired, there is little, if any, potential career growth as a technical specialist. The relatively small number of personnel involved in IMRL management, coupled with the lack of any real requirement for continuing technical development, would mean that IMRL specialists would have to feed into or transition to another specialty in order to be promoted to the next higher grade. The development of a separate Military Occupational Specialty for IMRL specialists is, therefore, both unnecessary and impractical. [Ref. 6: pg.18]

g) Recommendation (g)

Lastly the Audit recommended that the CNO require the IMRL managers course be continually updated. [Ref. 6: pg. 16] All concurred. [Ref. 6: pg. 18]

C. AMMRL INVENTORY MANAGEMENT RELATIONSHIPS

Having looked at the present state of SE inventory control, with the knowledge of what existed in 1989, the following paragraphs explain IMRL management relationships – focusing on how activities rely on the SERMIS database for decision support.

AMMRL Inventory Management Relationships depend on the validity of the one common database. The primary automated management information system supporting the AMMRL, and hence, inventory management is SERMIS. As stated in Chapter I, the AMMRL Program provides the basis for inventory management to all SE using activities throughout the Navy and Marine Corps. Although SERMIS program responsibility and authority is given to NAVAIR Code PMA-260 there are other agencies that rely on SERMIS. [Figure 1]

Information provided to and gained from SERMIS forms the basis for each reporting custodian's IMRL and facilitates acquisition, logistical support, inventory accountability, maintenance, and reporting of SE. The following paragraphs provide an overview of the SE inventory management system by identifying major activities involved, their locations, responsibilities and relationship to SERMIS information.

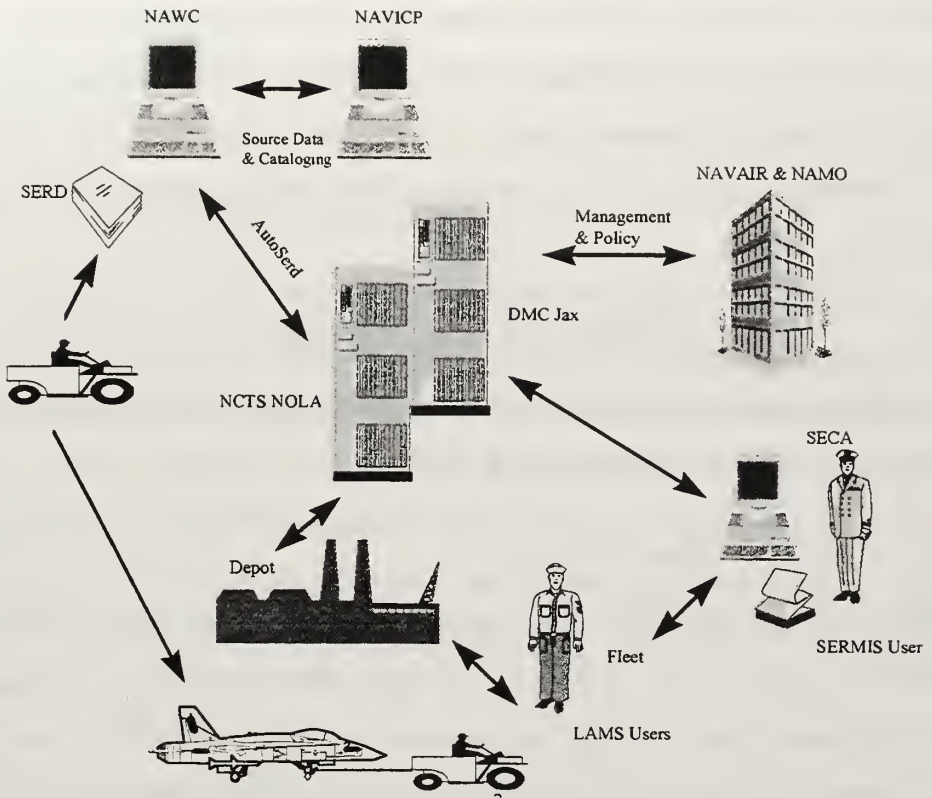


Figure 3. AMMRL Relationships[3] [Developed by Researchers]

1. The Reporting Custodian

SERMIS validity begins with the reporting custodian who depends on SE to maintain the material condition of their command's weapon systems. A reporting custodian is defined as any organizational or intermediate maintenance activity accountable for SE assets. They must establish and maintain SE inventory control via the LAMS and take action on all TRs directed to their command. After completion of an inventory, they must report all excesses to the SECA for disposition instructions and/or submit a survey for all unaccountable SE. [Ref.10, par. 10.21.3.5]

SE reporting custodians maintain their inventories a combination of two ways – centralized at the tool room/IMRL work center or decentralized where assets are sub-custodied to the work centers/divisions who use the SE. The individuals taking

[3] Figure 3 identifies agencies that are involved in AMMRL inventory management and who use or support SERMIS. [Ref. 15, slide 20] The SERMIS "information web" is portrayed as the lines connecting each agency in the Figure.

responsibility for the assets, whether or not the individual has the IMRL manager designation, is at the core of SE inventory validity. This process encompasses far more people than the few IMRL managers assigned to the unit. The validity of the IMRL manager's database, LAMS, is only as good as the information given by those who are responsible for the assets.

2. COMVAVAIRSYSCOM (a.k.a. NAVAIR)

COMVAVAIRSYSCOM presently resides in Arlington VA, however, will relocate to Patuxent River, MD during July 1997.

3. NAVAIR code PMA-260

PMA-260 uses SERMIS output to assist them in the design, test, evaluation, and acquisition of SE. [Ref.10, par. 10.21.3.1] They accomplish this task in coordination with each aircraft/weapon system assistant project manager for logistics (APML) and the commodity managers at NAWC(AD), Lakehurst, NJ and NAWC[Weapons Division (WD)], Point Mugu, CA [Ref. 12: slide 4]. Their collective efforts establish the requirements and procedures for the AMMRL program to ensure accomplishment of SE program objectives. SERMIS information also aids PMA-260, who with CNO code N-88, perform budgetary planning and funding execution of SE research, design, development, acquisition, and support projects. [Ref. 13:Vol.1, par.10.21.3.1]

4. NAVAIR code PMA-260C3

PMA-260C3, the primary support equipment controlling authority (PSECA), is the project sponsor for SERMIS and is charged with the management and direction of the AMMRL program.[Ref.10, par. 10.21.4.8] PMA-260C3 performs the material management responsibilities for NAVAIR cognizance SE line items with IMRL and SERMIS oversight. [Ref.10, para.10.21.3.2]

As the PSECA, centralized SE inventory management is accomplished by:

- coordinating redistribution of in-use assets among the five SECAs,
- tracking SE assets through SERMIS transaction reporting,

- reviewing Source Data Revision Recommendations (SODARRs)/SERMIS Source Data Reviews (SSDRs), and
- distributing new SE to authorized user commands. [Ref. 7: encl.9, pg. 1]

5. NAWC(AD), Lakehurst, NJ

NAWC(AD) is designated as the cognizant field activity (CFA) for the majority of SE. As CFA they possess overarching responsibility for providing initial engineering, procurement, logistics support, and allowance information for SE end-items [Ref. 7, encl. 2, pg. 11]. This information is processed and tracked in the form of Support Equipment Recommendation Data (SERD) in the SERMIS database. NAWC(AD) is also responsible for updating the SERMIS Source database which allows the Naval Inventory Control Points (NAVICPs) to process, incorporate, and update their files [Ref. 7: encl. 2, pg. 11].

6. NAVICP

NAVICPs are located in Philadelphia and Mechanicsburg, PA. NAVICPs are responsible for the material inventory management of SE. Material inventory management includes:

- requirements computation,
- distribution management,
- procurement,
- cataloging,
- disposal direction [Ref.10, para.10.21.3.9.1], and
- updating inventory information that facilitates catalog, package, repair, and contract functions. [Ref.15, slide 16]

7. SECA

The six SECAs are:

- Commander, Naval Air Force, Pacific (COMNAVAIRPAC),
- Commander, Naval Air Force, Atlantic (COMNAVAIRLANT),

- Commander, Naval Air Reserve Force (COMNAVAIRRESFOR),
- Commander, Naval Air Systems Command (COMNAVAIRSYSCOM),
- Chief of Naval Air Training (CNATRA); and
- Commanding Officer, Naval Air Maintenance Training Group (NAMTRAGRU). [Ref. 7: pg. 7]

The SECAs exercise overall planning, direction, and control functions for executing the AMMRL program for reporting custodians under their cognizance. The SECAs print and distribute SERMIS products, e.g., IMRLs, maintain and update selected SERMIS data including employment and inventory information, maintain in-use asset inventory control, and redistribute and report in-use SE [Ref. 7: pg.7]. NAVAIRINST 13650.1C [Ref. 7] gives overarching AMMRL program direction to the SECAs, however specific guidance and detail for program management, e.g., inventory procedures, is left to the discretion of each SECA.

8. Naval Aviation Maintenance Office (NAMO)

Naval Aviation Maintenance Office (NAMO), located in Patuxent River, MD, is responsible for SERMIS security, documentation, and instruction development. New AMMRL Program management requirements affecting SERMIS, as well as SERMIS efficiency matters are documented and validated by NAMO. They include software configuration/functionality, applications, and/or any aspect of SERMIS system documentation. Additionally NAMO responsibilities include SERMIS training, directed studies, and visionary initiatives that enhance system efficiency. [Ref. 10, encl. 8, pg. 4]

9. Naval Computer and Telecommunications Station (NCTS)

Naval Computer and Telecommunications Station (NCTS), located in New Orleans, LA, is the central design agency who maintains and administers the SERMIS data base. Their responsibilities include implementation of approved enhancements, development of the quality assurance plan, requirements tracking, and security for the SERMIS host computer system. [Ref.10, encl.8, pg.10]

10. Defense MegaCenter (DMC)

Defense MegaCenter, located in Jacksonville, FL, manages the primary server and administers application execution. Their responsibilities include batch processing, production functions, telecommunications and providing an ability for future system expansion. [Ref. 14: slide 14]

D. SERMIS DATABASE AND INVENTORY INFORMATION

The SERMIS source database is what links inventory information to the previously listed agencies. The bottom-line is SERMIS is the sole automated source of in-use Naval Aviation SE asset information used by SE managers when determining equipment allowances and excess/deficit status [Ref. 15: pg.1-1]. Although SERMIS serves as the primary inventory management tool for the SECAs, it has far reaching implications on the success of the AMMRL Program. The system maintains approximately 30,000 items of SE data as well as many ship and base loading combinations and the peculiar requirements for supporting approximately 1,000 aircraft maintenance activities, 200 airframe configurations, 70 power plant configurations and 1,600 avionics, missiles and armament systems [Ref. 15: pg.1-2]. The shear volume of data contained in the SERMIS source database is exceeded only by its importance in the management of SE throughout its life cycle.

1. "Closed Loop" System

SERMIS accomplishes life cycle tracking using a "closed-loop" system. This "closed-loop" system is an important concept when addressing inventory validity issues. The system provides tracking of in-use SE during the transfer cycle, centralized maintenance of reporting custodian inventory records, management by exception, and error detection in inventory reporting procedures [Ref. 7: encl.7, pg. 2]. As with any database management system, the output generated is only as good as the data input into the system. Therefore, in order for the SERMIS to be a viable tool, data input must be accurate, responsible and responsive. Again SERMIS data validity depends on the

individual in the work center/division/tool room who handles, uses and/or is responsible for SE assets.

2. Inventory Validity and the "closed-looped" SERMIS System

SERMIS absorbs a myriad of inputs from all AMMRL program agencies, stores and processes those inputs, and provides output to those same agencies for the management of SE assets. The purpose of this section is not to describe each output and input, as it relates to the SERMIS, but to highlight the two inputs, AUTOSERD and LAMS, that provide the basis for the SERMIS source database. This is not intended to belittle the importance of "total-system-interaction" but to emphasize that AUTOSERD and LAMS form the basis of requirements for SERMIS. The validity of these two inputs are what makes SERMIS a management tool rather than just another "DoD reporting requirement."

3. AUTOSERD

AUTOSERD is generated by NAWC(AD) in the form of a SERD. The SERD serves as the primary source of data for SERMIS, which is processed into the database by a bi-monthly AUTOSERD tape. The SERD provides initial engineering data describing the weapon system requiring support. It also provides procurement, logistics support, and allowance information for a recommended piece of SE [Ref. 7: encl. 2, pg. 11]. This document forms the baseline for the AMMRL program from a requirements standpoint. It establishes an approved "basis-of-issue" for each piece of SE. This basis-of-issue is compared against activity configuration information provided by the SECA, e.g., types and numbers of supported weapon system end-items. The comparison generates employment data for each IMRL, determining the appropriate numbers and types of SE for each reporting custodian. [Ref. 7: encl. 4, pg. 14]

SERD revisions are a continuing requirement throughout the life cycle of the aircraft or system [Ref. 7: encl. 2, pg.11]. In summary, the AUTOSERD provides the requirements to the SERMIS source database through additions, changes, and/or deletions of data resident in source data [Ref. 15: Appendix B, pg.B-3].

4. LAMS

LAMS is the only authorized means for automated management, tracking, and inventorying of SE assets at the organizational or intermediate level of maintenance [Ref. 7: encl.12, pg. 1]. Automated transaction reports (ATRs) adjust the running count of the reporting custodians on-hand assets. The IMRL manager is required to submit an ATR each time equipment:

- is gained by the activity,
- is transferred out of the activity,
- is surveyed,
- needs to be re-identified,
- is loaned to an activity, or
- is at a depot for the activity.[Ref. 16: pg. 1-1]

This process is used to validate input data and more importantly maintain a perpetual inventory process that provides real-time tracking of "day-to-day" IMRL transactions.

Successful setup and operation of LAMS requires a complete and accurate initial inventory [Ref. 16: pg. 1-1]. An accurate inventory serves as the "hinge pin" of the entire AMMRL program. As previously stated in this chapter, if the inventory is inaccurate, all other data in SERMIS is corrupted. This thesis considers an accurate inventory to have the correct quantity, serial numbers and locations of on-hand SE assets reflected in the LAMS database. Additionally, SERMIS and LAMS must mirror each other.

5. SERMIS Input\Output Rates

The importance of AUTOSERD and LAMS to the "closed-loop" system is reemphasized when considering "input/output" rates to the SERMIS Source Database. On-line transactions in the database average 16,000 per month with peaks of approximately 25,000 [Ref. 15: pg.2-6]. One can easily envision the magnanimous task of maintaining accuracy in the database and how those efforts become exponential with invalid physical accounting of SE.

Figure 2 shows the "closed-looped" system with a number of the agencies that provide input and receive output from the SERMIS source database.

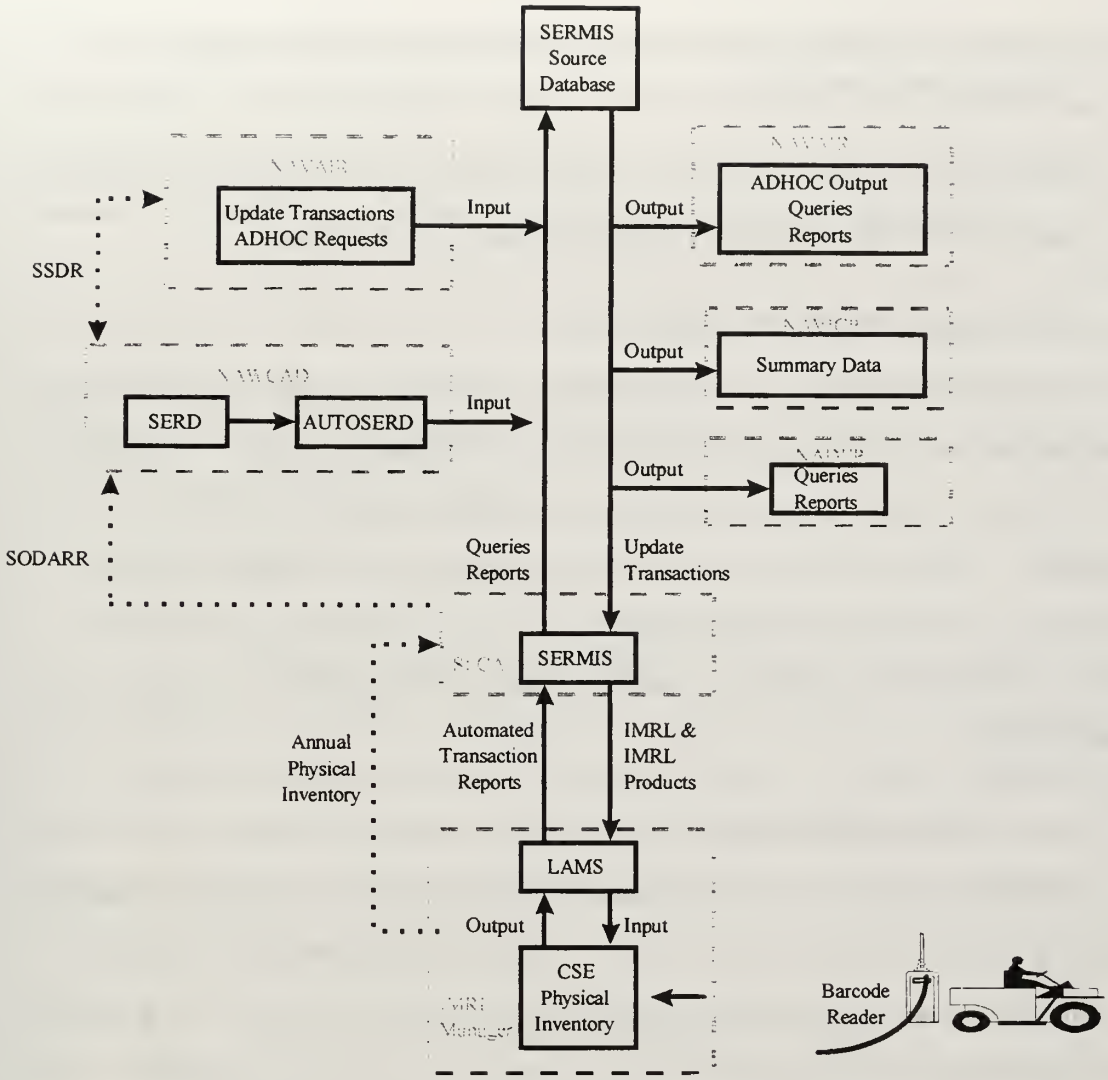


Figure 4 AMMRL Reporting Relationships [Developed by Researchers]

6. Policy Assumptions

One theme echoed throughout instructions and directives is that in order to ensure inventory validity, LAMS is heavily reliant on the tracking SE assets through the use of bar-coding. The LAMS manual [Ref.16: pg. 1-1] states "that all SE, including sub-custodied to another work center or to another organization, should be bar-coded and entered into LAMS". NAVAIRINST 13650.1C [Ref. 7: encl. 12, pg. 6] states,

> ...by using bar-code equipment that records inventory results on the database, highly accurate wall-to-wall inventories can be accomplished

and maintained with significant reductions in both manpower expenditures and operational disruptions.

Interpretations of these orders can conclude that bar-coding significantly assists the IMRL manager in identifying those SE assets which he/she is unfamiliar.

E. RESEARCH METHODOLOGY

The intent of our research is to quantify the Fleet's SE inventory validity through a sampling of sixteen units – four AIMDs/IMAs and twelve flying squadrons. A survey was sent to 240 units to gauge the level of knowledge throughout the Fleet on SE accountability, inventory practices, knowledge and confidence in the IMRL Manager's 'school house'. Our research required collection of data in three phases: a publication review, a mailed survey (Appendix A), and a physical audit (Appendix C) of unit inventory account validity.

1. Survey Methodology

A mail-in survey was used in this research because this is the most timely method of obtaining data from the study "population". The survey was designed to reach as many active aircraft squadrons and supporting IMAs and AIMDs in the Navy and Marine Corps including deployed units aboard ship and overseas. A total of 240 commands were selected for this survey from the Standard Navy Distribution List from the U.S. Navy Public Affairs Library [Ref. 17].

a) Survey Limitations

Those surveyed did not include any reserve aviation units or reserve support units.

b) Assumptions

Some assumptions were made regarding the expected response from the squadrons and the AIMDs/IMAs. Based on a review of squadron and AIMD/IMA Tables of Organizations, there are on average, at least two people involved with IMRL

management per squadron and at least four people involved with IMRL management per IMA/AIMD. This relationship of personnel varies from squadron to squadron and IMA/AIMD to IMA/AIMD depending upon personnel strength, size of the squadron, e.g., number of aircraft in the squadron, the number of squadrons supported by the IMA/AIMD, and whether the squadron or IMA/AIMD has a centralized or decentralized SE management. This model will be validated against actual survey responses and applies to both Navy and Marine Corps units. IMAs/AIMDs were limited to four surveys to get a "minimal" cross-section of the IMA/AIMD personnel yet limit the influence of the IMA's/AIMD's in the survey analysis.

c) Survey Design

The survey was written specifically for people managing IMRL at the organizational and intermediate levels. The survey provided demographic information about Fleet IMRL managers, levels of training, experience in the IMRL management field, unit inventory practices and methodologies, IMRL management perspectives and opinions. Space was made available at the end of the survey form for open-ended comments about SE and SE management.

2. Physical Inventory Validity Audits of SE Assets

To directly examine unit inventory validity, the researchers conducted physical IMRL inventories on a random sampling of line numbers from unit IMRL listings, LAMS 3 Reports.[4] Coverage for this study was determined to be an even sampling of Navy and Marine Corps units. Three fixed wing (FW) and three rotary wing (RW) squadrons from each Service plus the respective supporting AIMD/IMA were audited. This combination permits a comparison of data between Services and general aircraft type, i.e., FW or RW. The identity and location of the audited units remains anonymous to maintain a non-attribution environment. The researchers determined this to be critical to the study to eliminate any undue influence or alter inventory practices to accommodate what would

otherwise be construed as a "graded" or "observed" inventory on which the units and their commanders would be held accountable. The focus of the audit was to collect the most accurate data possible under normal, i.e., not inspection conditions.

a) Auditing Methodology

A list of line numbers were randomly chosen from a basic Excel macro at each unit in such a manner to prevent perceived or actual bias. This list was randomly selected on the total number of line items in each unit's LAMS 3 listing. From this list of generated numbers, the unit's IMRL manager was asked to create a hard copy listing from their LAMS terminals. Current LAMS listings were needed to ensure all transactions were recorded prior to our physical inventory. Transactions waiting to be entered into LAMS were considered in the process as long as their dates were reasonably current Reasonable currency was defined as five working days. Once the line numbers were retrieved and printed to hard copy, the inventory commenced. The auditors took custody of the LAMS list and provided the IMRL Manager the part numbers and associated location to be audited. During the last twelve audits, the auditors refrained from providing the number of units associated with a line number. This was done to better determine if excess SE was on-hand.

b) Limitations

The list was limited to at least twenty but no more than twenty five line numbers for each unit. This limitation was self imposed because of limited time and research funding. The researchers understand and accept the lower confidence limits (CL) inherent in this limitation, however, feel that a larger sampling would yield the same results at a higher CL with an associated higher cost.

---

[4] A LAMS 3 report lists in line order sequence all IMRL equipment the unit is accountable. This report lists the number of a particular piece of IMRL gear on hand, the number authorized and the location of the gear either within the unit or the unit to whom the gear is sub-custodied.

c) Definitions

A line number was described and recorded as "*valid* " when:

- the audited line number had the exact number of units the LAMS described,
- the units were in the location that LAMS described, and
- all serial numbers from the LAMS matched those on the assets in the inventory location.
- Unit validity (%) was calculated by dividing the number of valid line numbers by the total line numbers surveyed.

III. RESEARCH FINDINGS

A. STRUCTURE

Each of the following research findings contain qualitative and quantitative observations. The qualitative information came from notes taken while observing SE management processes during the course of this research and from Fleet input from the SE Survey. The quantitative information was processed from the data collected on the physical inventory audit, compiled from the survey questions, and provided by the Type Commander.

B. RESEARCH QUESTIONS

1. What is the validity of IMRL inventory records in the user's inventory record keeping database (LAMS -Local Asset Manager's System)?

a) What affects validity?

Squadron or IMA IMRL managers directly influence and manipulate the LAMS stand-alone database via direct keyboard entry or a floppy disk medium provided by the SECA. It is not unreasonable to assume or hypothesize that the LAMS database would provide the most accurate information concerning the IMRL inventory *within* a given unit. A similar hypothesis emanates from the notion of "accuracy" with respect to the size of a unit's IMRL account. Those activities with few line numbers may be able to better manage their accounts without the use or reliance on their management information system than their contemporaries with many line numbers. In terms of validity and accuracy, those activities with few line numbers may tend to have a higher inventory validity and a higher inventory accuracy (few assets to manage) than their counterparts (many assets to manage). High volume inventory managers can have an equal percentage validity but have *more* absolute discrepancies in their inventories. Fleet activities with large IMRL inventories, such as IMAs, would tend to be less accurate yet rely more heavily on their inventory management systems. In today's Fleet, LAMS is "the only

authorized means for the automated management, tracking and inventorying of SE assets" [Ref. 7:encl. 12].

The OMAs and IMAs audited in this study did follow these trends, but no two units used the same IMRL management styles. However, this research found this trend in inventory validity and accuracy was affected by two issues: the IMRL manager's knowledge (training/experience dependent) and use of LAMS (computer support dependent).

Units whose managers had little or no IMRL management training were observed to be encumbered by the LAMS and the IMRL management process. The untrained IMRL manager's inventory management practices tended to be more improvisational than methodical. The result was predictably lower inventory validity percentages in units with untrained managers than those units where the managers were school trained.

The second issue addresses IMRL computer support- specifically the LAMS 2.4 software and computer operating environment. LAMS 2.4 does not demand the latest technology in computer systems or exorbitant hardware to function properly. The minimum requirements[5] outlined in the LAMS User Manual are more than adequate provided the minimum requirements are available and the LAMS 2.4 software and Disk Operating System (DOS) are the ***only*** software running on the system. The LAMS User Manual addresses possible conflicts and recommends removing conflicting software.[6] [Ref.18:p.2-1] A "fool-proof" system is one dedicated exclusively to LAMS. Dedicating a computer system exclusively to LAMS operations would eliminate software conflicts and promotes increased use/confidence in the system.

An exclusive LAMS system is not practical for two reasons. First, the manager is responsible for other requirements demanding the use of scarce computer assets such as message text generation (MTF) and word processing. Recently, the U.S.

---

[5] LAMS 2.4 minimum requirements: 80-120 Mb Hard Drive, 512K RAM, 386 or 486 CPU – Peripheral equipment: Monitor, Dot matrix printer, 9440 Barcode scanner plus interface, 3.5" floppy disk drive.

[6] The LAMS user manual attempts to resolve memory conflicts with recommendations for editing "batch programs" (TSRs) that may be the source of memory conflicts. This technical knowledge is beyond the

Navy and U.S. Marine Corps adopted Windows© based word processors. The minimum hardware requirements for LAMS 2.4 will not support MS Windows© nor any accompanying Windows© based word processors. IMRL managers interviewed, in the course of this research, mentioned requests for an additional computer system capable of running Windows© and Windows© based software were rejected because "they already had a computer" and "other activities had higher priorities." A few systems, approved and sent to the requesting units, "disappeared" to other work sections deemed to have "more important" computer tasking.

Contrary to the above, two or more computer systems were discovered in each IMRL manager's work space in the course of the physical audits. When asked to identify the origins of the "extra" computer systems, each manager explained the source of the extra systems was predominantly the IMRL managers themselves. The extra systems were *privately owned*! Those units using privately-owned systems also used other database software such as dBase IV, to manage their IMRL inventory instead of LAMS software.

In units where other-than-LAMS software was employed, LAMS was viewed as a hindrance to inventory management. It is no coincidence, then, that lower inventory validity percentages occurred where privately-owned computer systems existed ***and*** where software other-than-LAMS was used for inventory management. The systematic practice of using privately owned computers "became SOP" one IMRL Manager explained because,

> [T]he previous manager transfers and takes his computer (and the database information) with him. The designated LAMS computer could not hold all the inventory database information (created in dBase) or run other programs simultaneously, so I brought my own to maintain historical records. – Interviewed IMRL Manager

This situation forces the activity to maintain two databases – LAMS and their privately-owned system – and to interface via modem with a third, SERMIS. Priority is on maintaining privately-owned database. However, SECAs still require ATRs

---

scope of an IMRL manager's working knowledge of LAMS 2.4 and thus is not taught at the IMRL Managers course.

for gains, transfers, surveys, and rework be uploaded from LAMS. Furthermore, the SECA requires a comparison report, AIRCOMP, run routinely which compares the information in SERMIS to the information in LAMS. An exception listing delineates all unmatched items which must be reconciled in LAMS or SERMIS [Ref. 18:encl. 11]. If a second inventory management system is in place, reconciliation must occur twice to keep both systems accurate and valid for real-time tracking and reporting. There exists an unsigned draft of COMNAVAIRPACINST 13650.2A instructing IMRL managers to, "...maintain an accurate, up-to-date LAMS database..." and achieve an "AIRCOMP inventory accuracy goal [of]... 98% or better"[Ref. 19: encl. 3, pg. 2]. For now, many units' physical inventory accountability is reliant on privately-owned databases. This ultimately means the SERMIS source database is receiving information from a group of neglected LAMS.

b) What are the validity percentages?

Table 1 summarizes the validity of units physically audited for this study using unit generated LAMS03 reports. The table is categorized by type unit (IMA, FW or RW [(M) USMC, (N) USN]), inventory validity, and the quantity of line numbers audited found to be in a deficit or an excess status. Inventory data sheets of all the units audited are included in Appendix B.

A total of 326 line numbers were randomly audited for this study. Deficit line numbers accounted for 16% and excesses accounted for 11.6% of the total line numbers audited. The mean validity for all units was 72.4% with a standard deviation of 16.5%!

When looking at inventory validity by unit, there are some notable differences. Figure 1 is an interval plot of the inventory validity percentages grouped by type of unit – IMA, fixed wing (FW) and rotary wing (RW).

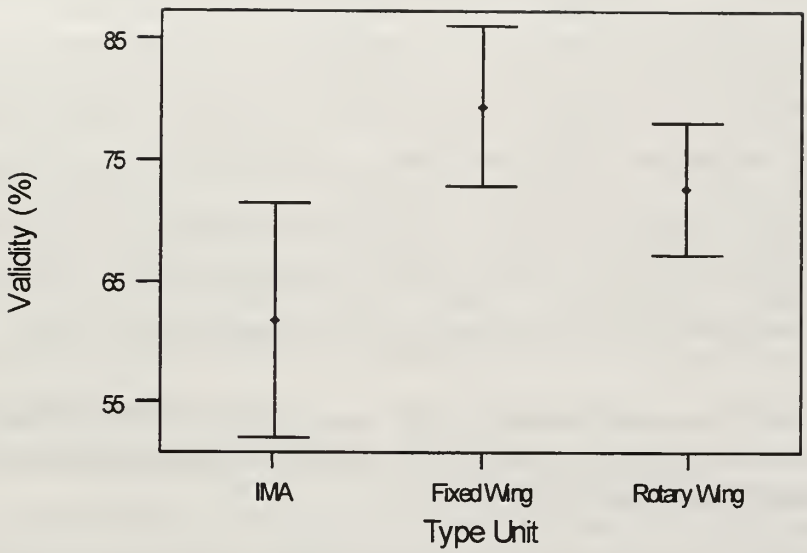


Figure 5. Type Unit Validity Comparison [Developed by Researchers]

Unit	Inventory v. LAMS (%)	Line #s in Deficit	Line #s in Excess
IMA(M) A	35	12	1
FW(M) 1	52.4	5	5
FW(M) 2	80	1	3
FW(M) 3	71.4	3	3
IMA(M) B	61.9	5	3
RW(M) 1	78.9	0	4
RW(M) 2	65	3	4
RW(M) 3	55	6	3
IMA(N) C	71.4	5	1
FW(N) 1	95.7	1	0
FW(N) 2	90	0	2
FW(N) 3	90	2	0
IMA(N) D	80	2	2
RW(N) 1	90.4	2	0
RW(N) 2	61.9	4	4
RW(N) 3	86.4	1	2

Table 2. Unit Inventory Validity [Developed by Researchers]

Fixed wing units have a significantly higher mean inventory validity than the IMAs (68% confidence interval) but only marginally higher than rotary wing units. Attributable causes for different percentages by type unit are vague but consistent with the previously noted training and LAMS system setup. Although the use of inventory standing operating procedures (SOPs) was low across the board (55 %), FW communities used SOPs at a higher rate (53.3%) than their RW counterparts (36.7%). IMAs, with lower validity, used SOPs much more than the units they supported (67.5%).

2. How accurately do the LAMS records reflect in the re-capitalization decision makers data base (SERMIS - Support Equipment Resources Management Information System) ?

This section of the research addresses the interface between LAMS and SERMIS. This interface is critical because it connects the users/managers of IMRL to the SE integrated program team members supplying and allocating IMRL equipment. To determine "how good" this interface is, three relationships were examined: physical inventory audit to LAMS data (inventory v. LAMS), physical inventory audit to SERMIS data (inventory v. SERMIS) and LAMS to SERMIS (LAMS v. SERMIS).

Inventory v. LAMS values reflect how tightly the unit IMRL manager controls his/her account and to what degree the unit LAMS reflect actual inventory on-hand. This score represents local IMRL management efficiency.

Inventory v. SERMIS values demonstrate how well the LAMS data are being transferred to the SERMIS database. This value reflects the degree to which the SERMIS database reflects actual on-hand inventory. Higher values permit better and more accurate decisions at the SECA or higher level.

LAMS v. SERMIS values reflect the bridge of reporting between the units and the SECAs. It does not take into consideration what is on-hand. It compares LAMS to SERMIS values only. This reflects the AIRCOMP inventory accuracy whose goal is 98% or better [Ref. 19: encl. 3, pg. 2].

a) Where is the degradation of inventory validity within SERMIS occurring?

The AMMRL Program SE inventory management system provides for inventory control at the SECA and local levels, as well as providing real-time visibility of reportable SE assets on a program wide basis. These physical inventory/LAMS/SERMIS relationships form the basis of the "closed-loop" system used to maintain the SE in-use inventory data that are continually updated by ATRs to the SERMIS source database [Ref. 7:encl.7, p.2]. As previously stated in Chapter II, this database is only as good/valid as the information input, so LAMS, and ultimately SERMIS, are not always a true reflection of actual on-hand assets.

These quantitative findings focus in on the physical inventory/LAMS/SERMIS relationships and lead to the strength of the closed loop system – SERMIS. The SECA has significant control over the data maintained in SERMIS and keeps the database updated as transactions occur. However the integrity of the SERMIS database is compromised in part from the LAMS/SERMIS interface and the absence of accurate physical inventories.

b) What is the quantitative breakdown of SERMIS inventory validity percentages?

The audit data from unit inventories are summarized in Table 2. The initial expectation is that LAMS validity should be better than the validity of the SERMIS list for the sample line numbers audited ***if*** the interface between LAMS and SERMIS is less than perfect. If perfect, the values will be identical.

Unit	Inventory v. LAMS	Line #s in Deficit	Line #s in Excess	Inventory v. SERMIS	Line #s in Deficit	Line #s in Excess	LAMS v. SERMIS
IMA(M) A	35	12	1	30	12	2	85
FW(M) 1	52.4	5	5	52.4	5	5	95
FW(M) 2	80	1	3	80	1	3	90
FW(M) 3	71.4	3	3	61.9	5	3	90.5
IMA(M) B	61.9	5	3	42.9	7	5	66.7
RW(M) 1	78.9	0	4	57.9	3	5	78.9
RW(M) 2	65	3	4	25	7	8	50
RW(M) 3	55	6	3	60	6	2	80
IMA(N) C	71.4	5	1	66.7	6	1	95.2
FW(N) 1	95.6	1	0	95.6	1	0	100
FW(N) 2	90	0	2	85	0	3	90
FW(N) 3	90	2	0	90	2	0	95
IMA(N) D	80	2	2	65	3	4	90
RW(N) 1	90.4	2	0	61.9	7	1	66.6
RW(N) 2	61.9	4	4	9.5	16	3	19
RW(N) 3	86.4	1	2	86.4	0	3	95.4

Table 3. LAMS/SERMIS Physical Audit Data [Developed by Researchers]

The far right column of Table 3 shows how well LAMS03 reports match with the SERMIS database based on percent matching lines.[7] These numbers are, on average, higher than the inventory figures but are still lower than the unofficial goal of 98%. Before actual inventories are conducted, there exists a disconnect between these two management systems. Considering sample inventory audits with these management systems, the relationship between the LAMS and SERMIS validity values for the units was demonstrated by plotting the inventory v. LAMS values (Figure 2) against the inventory v. SERMIS values.

[7] A value of 100 in the LAMS v. SERMIS column represents a perfect match between LAMS printouts and the SERMIS database. Likewise, a score of 50 indicates half of the LAMS line items matched the SERMIS database, etc.

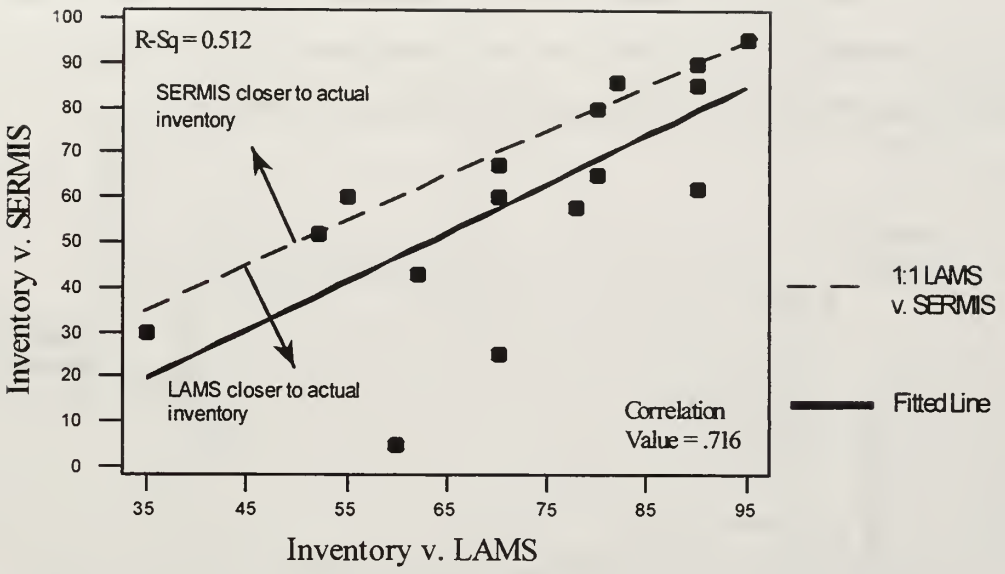


Figure 6. LAMS/SERMIS Relationship [Developed by Researchers]

Figure 6 shows a positive relationship between LAMS and SERMIS with a strong correlation (.716). This is intuitive to those familiar with the IMRL inventory process -- a higher LAMS validity *should* result in a higher SERMIS validity. An ideal relationship and a perfect interface or one-to-one relationship between LAMS and SERMIS is depicted by the dashed line. Above this line, SERMIS is the more accurate database; below this line LAMS is more accurate. Figure 6 clearly shows the majority of units audited having inventory validity closer to LAMS data than SERMIS data. This is consistent with the assumption formerly stated.

Figure 6 shows a trend in validity variance between LAMS and SERMIS as well. As the inventory validity goes down, variance in validity goes up. The LAMS validity figures had a mean validity of 72.4 with a standard deviation of 16.5, and SERMIS figures had a mean validity of 60.2, standard deviation of 25.1. The lower mean validity percentages in SERMIS support the notion of a disconnect between LAMS and SERMIS.

The greater variability from LAMS to SERMIS demonstrates as LAMS validity goes down the SERMIS database degrades in accuracy.

Analysis of Variance (ANOVA) interaction plots were used to depict the trend of the audited validity figures when transitioning from LAMS to SERMIS. In all cases the mean validity of the unit [Figure 3] or Service [Figure 4] went down.

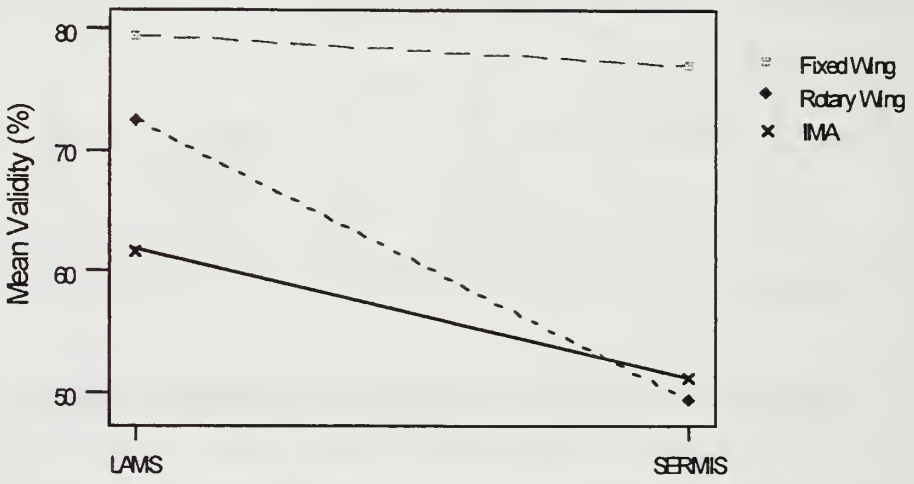


Figure 7. LAMS to SERMIS Relationships (by type unit) [Developed by Researchers]

The unit validity showed the same downward relationship between inventory v. LAMS and inventory v. SERMIS with the notable exception of the FW units. Fixed wing mean validity trend is downward but not to the degree of RW or IMA units. This is a recurring theme developed throughout his research.

Aside from the remarkable absolute difference in Service means in Figure 4, of equal significance is the rate of decline in validity of both Services from LAMS to SERMIS. These lines are nearly parallel meaning both Services' validity declines at *equal* rates. The downward trend and this rate of decline are two of the few constants throughout the study.

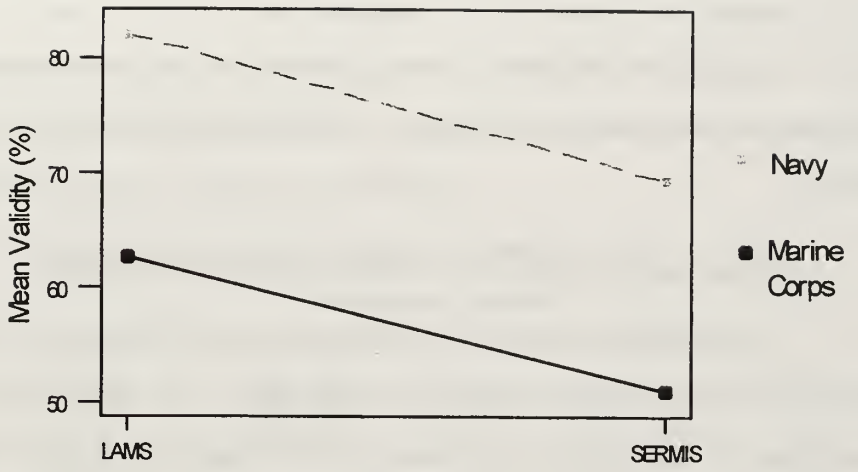


Figure 8. LAMS to SERMIS Relationship [Developed by Researchers]

3. Are either the Navy or Marine Corps' practices more efficient or effective over the other Service? Is there a relationship to aircraft material readiness?

a) Inventory Control versus 'Work-arounds'

The Navy and Marine Corps IMRL managers are trained at the same schools in several locations throughout the world. This training, though not required to actively manage IMRL, *is* required to be designated an IMRL Manager. The Navy and Marine Corps recently created NEC (9590) and MOS (6042) specific to this field.

IMRL Managers are acutely aware of their critical role in generating sorties for their units -- especially squadron IMRL managers. Many felt personally responsible if sorties were canceled for maintenance where SE was required. This pressure – whether real or perceived – is a driving force of innovation commonly called a "work around."

Workarounds are defined as using "field expedient methods" to perform maintenance on aircraft when SE is required but unavailable (Not-Ready-For-Issue) or

operational expediency demands it. Regardless of whether SE was used or not, as long as the aircraft becomes mission capable with an established margin of safety, the work around is considered acceptable but rarely documented.

On this premise, data collected during the on-site audits show that the Marine Corps units are significantly better at "work-arounds" than at inventory management.

b) Navy v. Marine Corps Quantitative Comparisons

A quantifiable measure of IMRL management effectiveness is the validity of the account for which IMRL managers are responsible. The validity data in Table 2 are plotted in Figure 5. This interval plot quickly reveals a significant difference between Navy and Marine Corps activities at an 85% confidence level. This is remarkable considering the equipment, procedures and training of IMRL Managers are very similar.

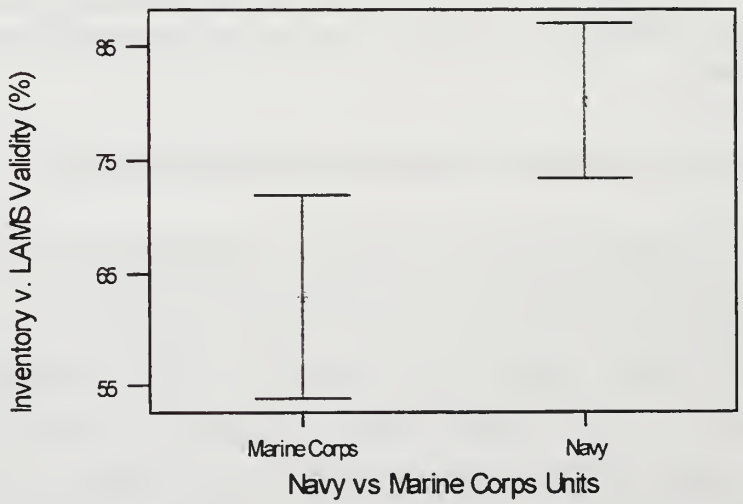


Figure 9. Navy and Marine Corps Validity Comparison [Developed by Researchers]

The management of IMRL equipment is accepted as an important part of aircraft material readiness through maintenance support. Yet, there is not in-place a method to directly measure the impact IMRL has on readiness with respect to

management of the IMRL accounts. To bridge this indirect link, a hypothesis was made to test this relationship: those units with superior control of their accounts would have better readiness figures than those with marginal control (a direct relationship). The readiness figures for the same Navy and Marine Corps units show unexpected results. Looking back at Figure 9 and then forward to Figure 6, the data show an unexpected inverse relationship between validity and readiness.

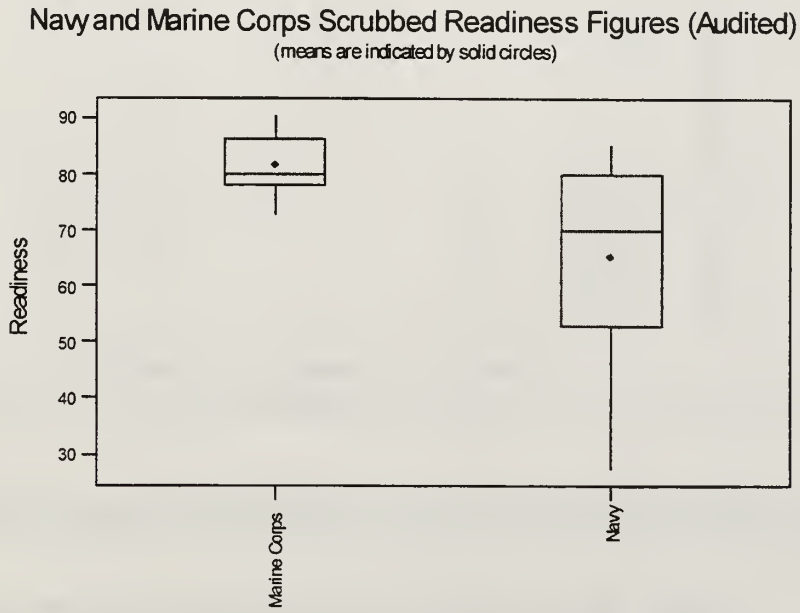


Figure 10. Navy and Marine Corps Scrubbed Readiness Figures (Audited FY 96) [Developed by Researchers]

The data show the Navy units to have a lower mean readiness and greater variation but a higher validity than the same Marine Corps counterparts (82% vs. 65%). This relationship is not intuitive nor expected. This inverted relationship may be attributed to the aforementioned "work-arounds" within the IMRL management system. These findings are consistent with Naval Audit findings stating there is no apparent correlation of inventory management (or validity) to readiness[Ref.5: Abstract].

c) *FW/RW/IMA Quantitative Comparisons*

Figure 7 is displayed to show validity by type units within the Services and the differences between them.

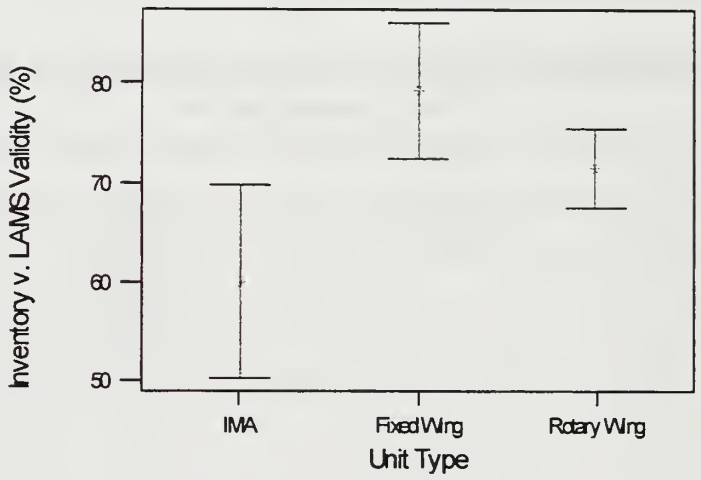


Figure 11. Navy and Marine Unit Type Comparison [Developed by Researchers]

Figure 11 shows, at a 68% CL, the fixed wing squadrons had significantly better validity than the IMAs but not significantly different than the rotary wing squadrons even though the mean FW validity was higher (79% vs. 71.5%). However, RW units had a smaller variance of the mean than their FW counterparts.

The fixed wing units broke out as significantly better in validity than the rotary wing units but at only a 50% CL. The RW validity was found to be significantly better than the IMAs but at the same 50% CL. Comparisons of readiness for these same units is graphed in Figure 8.

Fixed wing units consistently performed higher in validity and readiness although readiness across the board was similar.[8] The FW community is the only group supporting the hypothesis tying validity to readiness.

[8] IMA readiness was based on the mean readiness for the units supported during the same period.

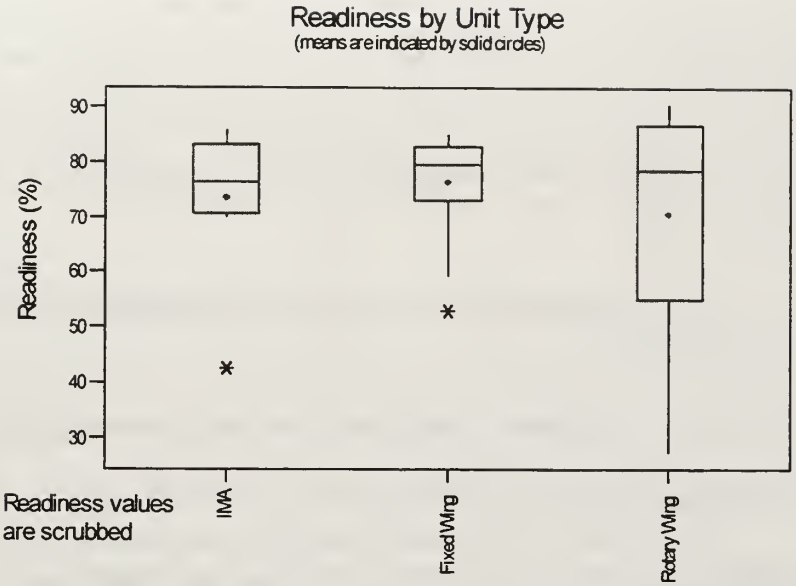


Figure 12. Readiness by Unit Type [Developed by Researchers]

4. Do the Fleet's SE inventory practices parallel Naval instructions?

a) What instructions were evaluated in this study?

A literature search was conducted to evaluate current IMRL physical inventory procedural directives. This research focuses on the procedures outlining the physical count of assets, and only covers the input mechanism to LAMS as they pertain to the barcoding interface. The counting phase of a physical inventory is the first step leading to accurate or corrupt LAMS/SERMIS databases.

The IMRL physical inventory procedures are compared to aviation depot level repairable (AVDLR) supply inventory procedures as detailed in the Marine Corps Aviation Supply Desk-Top Procedures [Ref. 20]. AVDLRs are not managed exactly in the same manner as SE, but there are principles that may be applied to both.

The following paragraphs highlight the written IMRL inventory procedures starting at the OPNAV instruction level down to IMAs within COMNAVAIRPAC.

Orders from within COMNAVAIRPAC were the only orders consulted at or below the SECA level. A decision was made to exclude the remaining SECAs' orders because there was no opportunity for on-site audits and interviews. Although this presents a viewpoint from only one of six SECAs, the results, when compared against historical data, are representative of AMMRL program inventory practices throughout the Navy and Marine Corps [Ref. 6].

b) How much is written about the counting phase of a wall-to-wall inventory?

The NAMP states, "The procedures for allowance and inventory control are defined in NAVAIRINST 13650.1C" [Ref. 13: Vol.1, par. 10.21], which states,

> The SECAs exercise overall planning, direction, and control functions for executing the AMMRL Program for activities under their cognizance. The SECAs....maintain in-use asset inventory control....SECAs publish instructions giving specific direction and detail for operation of the AMMRL Program to AMMRL SE managers under their cognizance. [Ref. 7: para.7.g].

This is interpreted to mean that the SECAs have the responsibility to write inventory procedures for activities under their cognizance.

COMNAVAIRPACINST 13650.2 covers the subject, "Annual Inventory," in less than one page [Ref. 18: encl. 6, par. 13]. The enclosure in LAMS has a paragraph titled *"Annual Inventory Procedures"* which describes the inventory process using barcoding equipment [Ref. 18: encl. 14, par. 5].

AIMD North Island, considered during this research to be a model SE installation, wrote an SOP for IMRL management which includes an enclosure titled *Annual IMRL Inventory Procedures* [Ref. 21:encl. 7]. This enclosure is approximately one page in length.

The FASO Instructor Guide spends 3.0 instructional hours on physical inventory procedures[Ref. 21: Lesson Topic: 3.1.3]. This lesson details barcoding procedures and briefly describes procedures for conducting an inventory count.

c) Who writes the IMRL inventory procedures?

The SECAs are responsible for the preponderance of the material written on IMRL inventory procedures. Each SECA writes their own procedures for units under their cognizance, so there are, conceivably, different – possibly conflicting – procedures between SECAs. As IMRL managers rotate, they must learn the procedures of the different SECA.

Each SECA consists of a hand-full of people responsible for writing and updating inventory procedures. Writing adequate procedures is a time consuming task requiring an exhaustive knowledge and experience base in applied inventory management.

d) What is the state of written SE inventory procedures?

In the opinion of an expert with 35 years AVDLR inventory control – Mr. Littrell, a former Marine limited duty aviation supply officer and currently a contractor with the 2d Marine Aircraft Wing Management Assist Team – the references on SE inventory procedures are a good beginning to describe wall-to-wall inventory procedures but are lacking necessary detail. He also explained the process used to refine similar inventory procedures, e.g., those for supply department assets. The Marine Corps Aviation Supply community developed detailed desk-top procedures which include those for inventory and location audits [Ref. 20: pg. F1-F48, G1-22]. This effort was centered at the "school house" and involved many experts in the aviation supply field. A contractor was hired to coordinate the input and writing. Experts from all aspects of aviation supply management were invited to conferences to facilitate the writing in a dedicated, uninterrupted environment. Draft procedures were sent to Fleet units for critique. This accomplishment took many rewrites and years to validate. Streamlining these procedures is an on-going process which is improved upon and revalidated periodically. Mr. Littrell also stated,

> Inventorying is a complicated process. Individuals require detailed procedures and need to be involved in four to five inventories before they really become proficient at the process. I have been involved in inventories where the desired 98% validity was not achieved, but felt the experience

was worthwhile because personnel received valuable training on how to conduct inventories. [Ref. 23]

Overall there is little written to detail the counting phase of an IMRL inventory and what is written does not detail the inventory principles described in subsequent paragraphs. Considering the complications involved in the counting phase, comprehension of this process is suspect. From the mail-in survey of Fleet inventory practices, this suspicion was confirmed. SOPs outlining the execution of inventories are not widely used. Forty-nine percent of respondents surveyed **do not** use SOPs (Figure 9). Undetermined is whether the remaining 51.1% are using locally generated SOPs or are using SECA/NAVAIR instructions as SOPs. On-site audits confirmed the latter better describes Fleet practices.

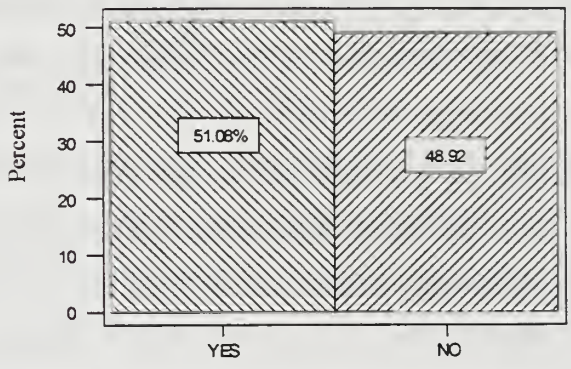


Figure 13. SOP Use [Developed by Researchers]

e) What are the inventory requirements?

The literature search revealed a requirement for an annual wall-to-wall IMRL inventory [Refs. 6 and 10]. The NAMP requires physical IMRL inventories be conducted annually and also requires the inventory be wall-to-wall [Ref. 13: Vol. 1: par.10.21.3.5.g and 10.21.5.5.1]. The NAMP does not define "wall-to-wall inventory"

nor does it give procedures for conducting such an inventory. NAVAIRINST 13650.1C also requires an annual wall-to-wall inventory.

A COMNAVAIRPACINST 13650.2 enclosure on LAMS has annual inventory procedures which established a quarterly inventory cycle by divisions, e.g., First Quarter (JAN-MAR) - 600 division (avionics) [Ref. 18: encl. 14, par. 5]. By definition this is a cyclic inventory and not a wall-to-wall inventory and contradicts both the NAMP and NAVAIRINST 13650.1C.

(1) What is the definition of a "wall-to-wall" inventory?

A "wall-to-wall" inventory is defined as first, list all SE assets found at an activity and second, compare that list with the recorded inventory in SERMIS and the LAMS, and finally reconciling differences [Ref. 6: pg. 14]. This differs from merely finding what is listed on the LAMS database – a practice which does not lend itself to finding excesses or misplaced assets. "Wall-to-wall" vice cyclic inventories are required in order to achieve the most accurate results. "Wall-to-wall" inventories facilitate a better chance of discovering and reconciling excess and/or misplaced assets. A true example to illustrate this follows:

> The avionics (600) division within an IMA is missing a test set that was borrowed by the ordnance (700) division but never returned. Avionics technicians lent the test set to their ordnance friends months ago and did not fill out requisite sub-custody paper-work which provides a custody/audit trail. Short memories or transfers make it impossible to determine if ordnance has the test set. The SECA, then, came out with a directive to transfer the test set which could not be found. This resulted in an embarrassed avionics division who subsequently surveyed the test set and requested a replacement asset.

This is an example of misrepresented IMRL usage/needs and is a demonstration of one source of corruption to the SERMIS database.

A "wall-to-wall" inventory of the entire IMRL account requires all divisions to perform a concurrent inventory with an IMA centralized control desk responsible solely for identifying and placing excess/misplaced assets. This process would

have provided a timely opportunity to find and return the IMRL equipment such as the avionics test set in the example.

(2) Are units conducting wall-to-wall inventories?

From the survey, Figure 10 shows that 97.8% of those filling out the survey believe they are conducting wall-to-wall inventories.

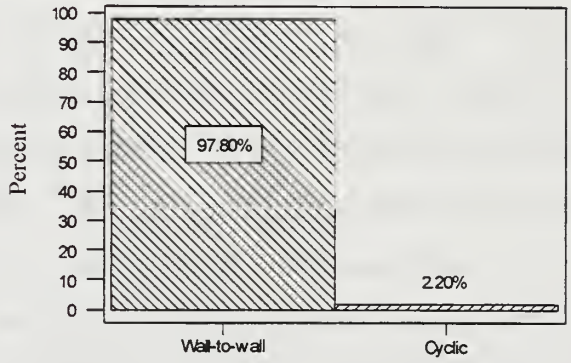


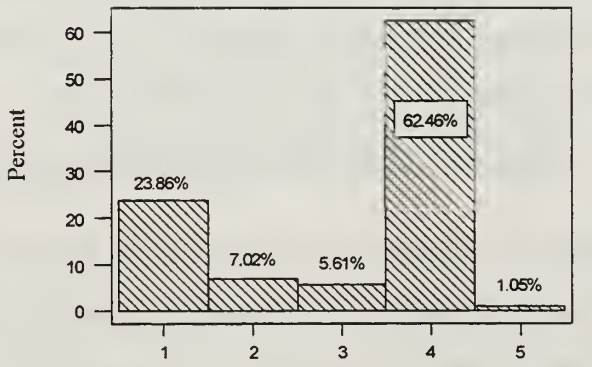
Figure 14. Type of Inventories Performed [Developed by Researchers]

This research, in concordance with the 1989 Naval Audit on SE, determined a majority of units *are not* conducting wall-to-wall inventories [Ref. 6: pg. 14]. The difference between correct wall-to-wall inventory procedures and the Fleet's perception is IMRL managers are only concerned with inventory validity as it pertains to the LAMS database. During the physical inventory validity audits, units wanted to find only those items listed on the LAMS03 printout. While conducting twelve audits, the responsible people were not told how many assets were recorded on LAMS. The response was met with frustration because units were not accustomed to clearing-out entire locations to see how many assets may be found.

(3) Why are wall-to-wall inventories difficult to conduct?

Wall-to-wall inventories are difficult to achieve for two reasons: 1) SE managers have not received formal instruction on creating and maintaining specific locations within the work-centers/tool rooms/divisions and ultimately within LAMS, and,

2) as previously mentioned, SE managers do not vacate entire IMRL locations . Most units do not have their entire on-hand IMRL inventory assigned to specific locations with a cross-referencing system providing information on item location. Most often, the LAMS reports identify the locations as the work-center or division. Figure 11 identifies the specificity in which units identify IMRL locations and reinforces observations during physical audits. Over sixty percent of the respondents (62.5%) identified asset location by work-center. Less than 25% stated they assign specific locations with a painted shadow. Small IMRL assets, such as tools, were often shadowed, but no units had a completely shadowed location system.



Legend:
1. Specific locations are assigned with a painted shadow
2. Location identifies 1 meter x 1 meter area
3. Location by room number
4. Location by work center
5. Location by squadron

Figure 15. IMRL Location Specificity [Developed by Researchers]

Most IMRL managers seem to recognize the need for specific locations and a cross-referencing system. As a result many are attempting to devise their own IMRL management systems. This motivation and innovation results in some of the assets being cross-referenced while others are cataloged only in a technician's memory. This ad-hoc system of identifying locations makes wall-to-wall inventories very difficult.

This situation is further complicated by the nomenclature descriptions on the LAMS printout. LAMS nomenclatures do not adequately describe individual pieces of SE making identification nearly impossible. An example of a nomenclature is *"test-set"* or *"adapter."* These vague descriptions combined with no visual referencing system, make researching losses difficult. One of the audited units had created a picture catalog of all their SE assets.

One exceptionally organized unit has created specific locations and cross-referencing systems to easily identify when assets are in calibration, on-loan, at the IMA, etc. They are working on but did not have a complete system that identifies what equipment should be found in a specific location. The aforementioned unit, however, was a training command which can establish permanent locations because they do not deploy large numbers of IMRL assets. Frequent deployments/detachments requiring an IMRL pack-up significantly degrades location cross-referencing efforts.

f) What is a location consolidation/reconciliation audit?

A location consolidation/reconciliation audit facilitates a wall-to-wall inventory. The purpose of a location audit is two-fold. One is to consolidate like material into the minimum number of locations necessary. The second is to ensure the physical location of material corresponds to the location recorded in the inventory management system. Location audits are completed prior to the count phase of an inventory. They should not be done in conjunction with counting. This process finds misplaced assets and erroneous locations in unit IMRL inventories. To make an inventory as easy and efficient as possible, location validity should be as accurate as possible. The time between a location audit and the inventory count should not exceed three days and 100% of all storage areas should be audited [Ref. 20: pg. G-3]. Unlike existing IMRL inventory procedures, the NAVSUP P567 requires location consolidation/reconciliation audits for AVDLRs [Ref. 24: Appendix 2].

Location audits completed prior to an inventory increase the accuracy of wall-to-wall inventories. None of the aforementioned references contain a requirement for

a location audit prior to a physical inventory count. Figure 12 depicts those units conducting location audits prior to inventorying assets. Despite little to no guidance, 40.6% of those surveyed perform a location audit.

The specifics of their process are unknown, as are the effects of the trend in identifying locations only to the work-center/division. There remains 59.4% that do not conduct location audits.

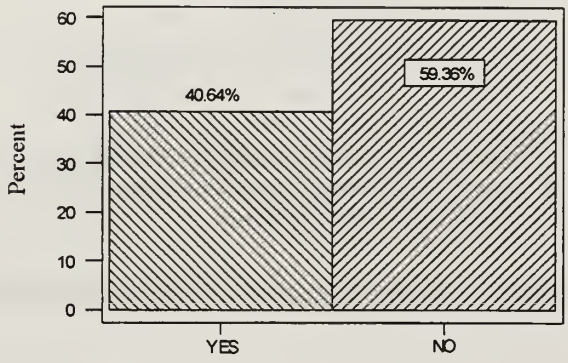


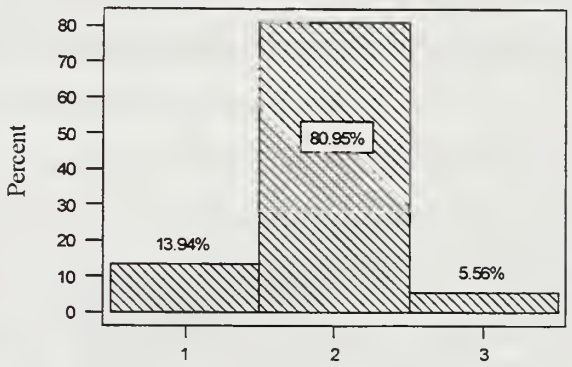
Figure 16. Location Audit Prior to Inventory [Developed by Researchers]

g) Do units conduct a sub-custody reconciliation?

A sub-custody reconciliation is a process of verifying material, assumed to be sub-custodied, to ensure it is accounted for by the sub-custody activity. As a contrast to existing inventory procedures, the Marine Corps Aviation Supply Desk-Top Procedures require: 1) AVDLRs on custody to a local activity be physically verified by a supply representative and 2) AVDLRs sub-custodied to other than local activities be verified by phone or message [Ref. 20:pg. F-17]. Figure 13 shows how units reconcile/verify mobile material before they begin counting assets.[9] From those surveyed, only 13.5% of the respondents personally call the activity and have them do a physical check. A majority,

[9] Mobile material is defined as equipment on loan, being calibrated, or in work at an IMA/Depot

80.9%, rely on a signature form. This trend puts SE sub-custodied for an extended period of time at the greatest risk of never being returned.

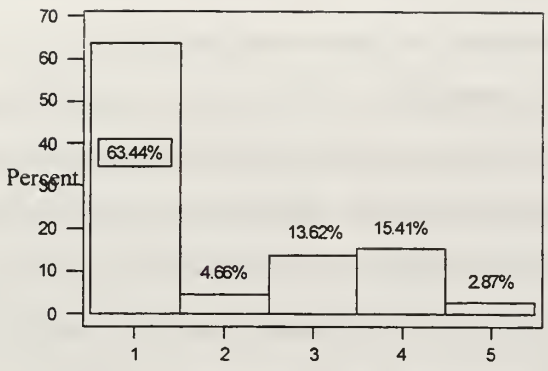


Legend:
1. Personally call the activity and have them do a physical check
2. Maintain forms with a signature from the activity that has the asset
3. Trust LAMS records are correct

Figure 17. Material Reconciliation [Developed by Researchers]

h) How well do units control assets during the count phase?

None of the references mentioned restricting (freezing) the use of assets during the counting phase. Freezing the use and movement of SE simplifies the process and ensures assets are not reported as missing when they are on-board. One can imagine the chaos of trying to count assets as SE is being transported to and from aircraft and on and off the flight line. Figure 14 shows the extent to which units restrict the use of IMRL assets during the inventory counting/barcode scanning process. Greater than 60% of respondents surveyed conduct SE business as usual while inventorying.



Legend:
1. Business as usual
2. IMRL assets may not move or change status
3. IMRL assets may move or change status if the asset is tracked through a control desk
4. Once an asset has been scanned it may move or change status
5. Other

Figure 18. Asset Mobility during Inventory [Developed by Researchers]

i) Are units using barcoding equipment?

All the references provide information on using barcoders. Unfortunately the question not asked was, "Does your unit use barcoders to conduct inventory counts?" However, of the 16 units audited, not one unit had experienced a recent successful inventory using barcoders. Units do not use their barcoders to inventory. However most units do try to barcode their material, not for efficiency sake, but to fulfill the requirements of the program. Unit managers described some problems and frustrations with the barcode system and felt a manual inventory was more efficient. Manager observations are included below.

- A system is needed for exceptional equipment unable to accept barcodes labels because of size, surface or function.[10]

[10] Exceptions are noted in SE Asset Manager Student notebook but barcode labeling for accountability of those items is not specified.

- If the label gets scratched or is on a curved surface the reader will not scan the label.
- The barcode reader does not immediately identify, e.g., via a beep, an item not on the reporting custodian's LAMS. If a work-center scanned 100 items with a barcoder, upon down-loading the scanner, two lists would be produced by LAMS – items on the inventory and items not on the inventory. With these two lists the user must now go back and re-inventory the shop to find the items not on the LAMS inventory. (This situation is complicated by the difficulty of recognizing seldom used assets from inadequate nomenclature descriptions.)
- Scanners do not verify condition code and calibration status and most activities do not use barcodes to identify locations, therefore a manual inventory, including an ability to verify these readiness items, is preferred.
- The scanner often times itself out or the batteries die resulting in scanners dumping data before uploading the data to LAMS.

Most upper level management interviewed within the maintenance departments *did not* know their units were *not* using the barcoding technology – they assumed it works and is a valuable tool in the management of SE.

j) How is inventory validity verified?

The NAMP requires the reporting custodian submit an inventory report to the SECA concerning the annual physical inventory [Ref. 13: Vol. 1, par. 10.21.5.3.b.]. The NAMP does not outline specific information the report should contain nor does the NAMP require an audit to statistically determine the validity achieved. None of the AMMRL instructions researched require a validity audit.

(1) What reports concerning validity are required?

The COMNAVAIRPACINST 13650.2 does abide by the NAMP and requires an annual inventory letter, *"Report Of Annual Wall-to-Wall Physical Inventory Of On-Hand IMRL SE"* [Ref. 18: encl. 6, exhibit I]. The report requires an enclosure which contains serialized SE Transaction Report Forms OPNAV 4790/64 (5-

88). These ATRs correct any discrepancies discovered during the inventory. The report also requires the date of the inventory and the statement, "Equipment custody records have been updated to accurately reflect on-hand/in-use quantities" [Ref. 18: encl. 6, exhibit I]. The report does not require statistics on inventory validity.

The NAVSUP P567 requires a 98% validity for AVDLR inventories [Ref. 24:Appendix 2]. The Marine Corps Aviation Supply Desk-Top outlines the procedures to conduct an audit to verify validity [Ref. 20: pg. G-3]. The COMNAVAIRPAC 13650.2_ draft does mention a *means* to measure the validity between LAMS and SERMIS, but does not specify a goal nor a method to measure validity between the physical inventory and SERMIS [Ref. 19: encl. 3, pg. 2].

(2) Do higher headquarters inspectors check SE inventory validity?

Inventory procedures were not examined at all SECAs –only COMNAVAIRPAC. The COMNAVAIRPAC instruction on Aircraft Organizational and Intermediate Maintenance Department Evaluation /Assistance/Inspection Program Guidelines does not mention IMRL inventory account validity [Ref. 25].

(3) Do the centralized IMRL Managers of an activity audit/verify an inventory submitted by a work-center/division?

IMRL Managers often delegate responsibility for IMRL assets to the work-center/division. The work-center/division IMRL manager receives a LAMS03 listing detailing the IMRL for which he/she is responsible. The assets are inventoried periodically and a signed LAMS03 is returned to the central IMA IMRL Manager.

IMA IMRL managers were frustrated by deficits/excesses discovered during the research audits. The source of their frustration was work-center/division IMRL managers had recently inventoried and signed the LAMS03 reports with no noted problems acknowledging custody and responsibility. Although the centralized manager is responsible for maintaining the LAMS database from work-center/division input, IMRL managers have no authority to physically verify the IMRL validity noted on the signed LAMS03 report.

In the Marine Corps, this situation also extends between the MALS IMRL managers and those in the flying squadrons. The MALS IMRL manager is given responsibility over squadron IMRL without means to exercise authority. The IMA IMRL manager functions merely as a consultant to the squadrons. It is the squadron who makes the final determination of which suggestions to incorporate.

One particularly organized IMA recognized that inventory audits offer managers decision support on inventory matters. This IMA's IMRL SOP includes as one of the duties of IMRL Manager, "conducting periodic, unannounced physical on-site IMRL inventory spot checks, subject to be accompanied by MO/AMO/MMCO" [Ref. 21:Appendix: "Duties of IMRL Manager"]. The SOP does not detail how the spot checks are to be performed.

k) Is gross inventory adjustment (GIA) an issue?

The NAVSUP P567 states that gross adjustments include the absolute values of the following:

- Gains by inventory
- Losses by inventory
- Losses by survey

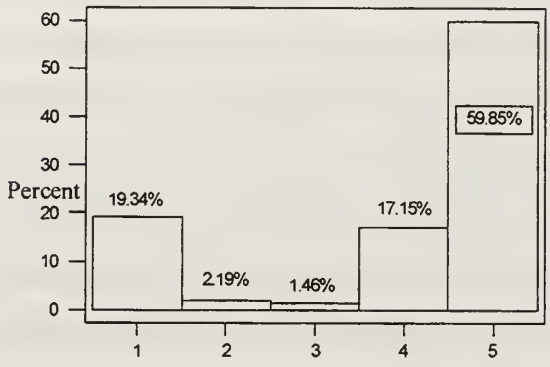
Note: Gains by inventory are considered into GIA [Ref. 24: par. 3020].

The COMNAVAIRLANTINST/COMNAVAIRPACINST 4440.1B gives GIA goals of one and one half percent (1.5%) [Ref. 26: pg. 9-26]. This directive gives guidance which offers indicators for management decision support. However this directive is usually only applied to supply department accounts.

The concept of inventory control is desired by SE managers, but it appears the tools to assist management decisions are not well understood.

Figure 15 breaks down the financial adjustments units made at the completion of their last inventory. This figure indicates greater than 50% of IMRL managers did not know the dollar figure for the adjustments made on their last inventory.

IMRL managers are not using a valuable management indicator nor do they address the dollar value of the assets for which they are responsible.



Responses:
1. 1% of total inventory worth
2. Less than $1 million
3. Less than $250 thousand
4. Less than $50 thousand
5. Unsure of figure

Note: 25 responses said they had zero adjustments.

Figure 19. Financial Adjustments [Developed by Researchers]

COMNAVAIRPACINST 13650.2 does not mention gross adjustments but does give guidance on SE survey procedures. Surveys are required on a piece of IMRL for the following reasons:

- Beyond Economical Repair
- Obsolete
- Missing Equipment
- SE Lost in Shipment

Note there is nothing mentioned about documenting excesses with a survey nor are there GIA goals. However, ATRs identify and correct the excesses in the LAMS

and SERMIS databases and message traffic to request disposition instructions are required for excesses.

(1) How are excesses perceived by IMA managers?

An interviewed material control officer stated, "If you took the dollar value of my excesses and subtracted the dollar value of my losses, my unit is way ahead." This is mentioned, not to embarrass anyone, but to indicate that the IMRL culture promotes the notion that excesses are good.

Some units audited had SE assets stored and/or preserved in mobile facilities or tri-wall boxes. These stored assets were being transferred in from other activities standing down due to Base Relocation and Closing iterations. Commissioned units are receiving containers of SE which they are to take responsibility from decommissioned units. This process is not a well coordinated effort. The user's view on excesses is that they are not considered a serious inventory control problem and accountability is haphazard. Shipping units would discover excesses unaccounted on their LAMS/SERMIS during the course of consolidation. Instead of correcting LAMS before shipment, they merely include the equipment in the shipment with no transfer paperwork. The receiving unit either absorbs the excesses unofficially into a work-center/division or warehouses the excesses offering no visibility on the asset. This was not observed to be an act of commission, but rather omission brought about by overwhelming conditions accounting for on-hand SE.

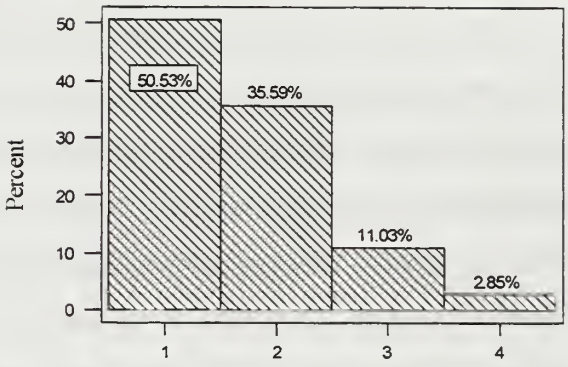
Additionally, there seems to be a prevailing attitude of maintaining a "just-in-case" inventory. The on-site audits identified large amounts of equipment in preservation status. This was a result of several conditions. The first was preserved equipment is seldom used, however, required during special circumstances, e.g., operating in cold weather, desert, and/or wartime environments. The second was excess, obsolete equipment. The equipment was obsolete because a more advanced piece of equipment, serving the same function, had been introduced or, the airframe it supported has been retired. In this case the IMRL activity having reporting custody of SE in excess will notify its cognizant SECA by letter or message traffic requesting disposition instructions [Ref. 7:

encl. 5, p.4]. Upon receipt of the message, the SECA will try to redistribute the excess to other activities under its cognizance or to other SECAs having valid, unfilled SE requirements [Ref. 7: encl. 5, p.5]. If it is determined a deletion is warranted from the System List Model (SLM) files of the AUTOSERD and SERMIS, the requesting activity must submit a SERD SLM update request. This submittal is then referred to the cognizant Weapons System Manager, Avionics Weapons system manager, and or project Support Engineer for review and approval. No request for deletion of an asset is honored without this approval [Ref.6: encl. 5, pg.5]. Comments from the survey and on-site interviews expressed frustration by this process. IMRL Managers submit the request for deletion of obsolete equipment and fail to receive disposition instructions in a timely manner, if at all. The third cause of excess is that excesses are intentionally held by IMRL managers to cover possible losses, "just-in case".

(2) How are losses perceived by IMA Managers?

Losses, in contrast to excesses, are taken very seriously. A constant theme emerged in the concerns/comment section of the survey and during unit interviews: *missing equipment surveys are a means of assigning culpability.* Surveys are, by definition, a written audit trail (history) of the actions taken to reconcile the inventory discrepancy and are also a means of encouraging a thorough search for assets. Figure 16 shows unit attitudes towards submitting surveys. Of those surveyed, 51% of respondents believed submitting almost zero surveys is an indicator of good inventory management. The question in the mail-in survey referred to surveys in general and not specifically to missing equipment survey. Survey results include all forms of surveys conducted within the units.

The researchers believe submitting zero surveys means living with discrepancies and or filling those discrepancies with "invisible" excesses. In either case, equipment visibility for usage is negated and its use and the system suffers. A constant but small number of surveys indicates good inventory management.

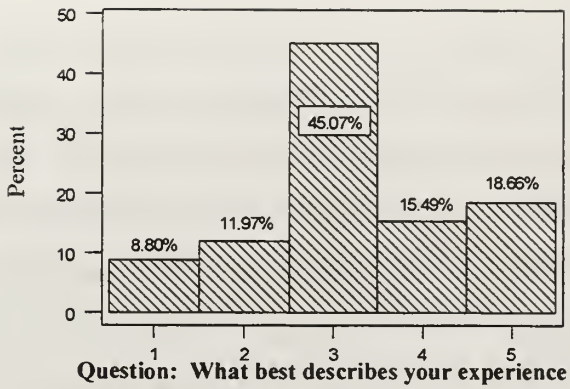


Legend:

1. Submitting almost zero surveys indicates good inventory management
2. A constant but small number of surveys indicates good inventory management
3. Surveys are avoided
4. A surge of surveys is expected after inventories

Figure 20. Survey - Unit Attitude Towards Equipment Surveys [Developed by Researchers]

Figure 17 describes the IMRL manager's experience with submitting surveys. Over half (56%) of IMRL managers felt confident about submitting surveys. Conversely, 44% have either never submitted a survey or had the survey met with disapproval and/or frustration. This attitude appeared to be purely cultural and followed no particular pattern from Service to Service or unit to unit.



Question: What best describes your experience with submitting surveys?

Responses:

1. It was difficult to find out the process and the chain of command is unsure/uncomfortable approving the surveys
2. I was unsure of the process but easily found the information and my unit expedited the survey up the chain of command
3. I am very familiar with the process and my unit will expedite the survey up the chain of command
4. I am familiar with the process and my unit discourages submitting surveys
5. I have never submitted a survey

Figure 21. Survey Submission Experience [Developed by Researchers]

5. How effective are Fleet Aviation Specialized Operational (FASO) schools educating IMRL Managers?

a) How do today's FASO IMRL Manager's Courses compare to what was taught prior to 1988?

According to the1989 Naval Audit, what the Navy/Marine Corps leadership perceived as the "real problems" differed from what was discovered during the audit with regard to staffing IMRL positions with properly trained personnel [Ref. 6: pg. 19]. Specific findings related to this recommendation included:

- Over 95% of all IMRL managers audited had attended the IMRL managers course or had other qualifications for performing the function.

- Nearly 45% of personnel assigned to assist the IMRL managers had similar qualifications.[11]
- By the time IMRL managers become familiar with the operation, equipment, and peculiarities of an activity, hence fully productive, transfer occurs. This is a continuity problem. The IMRL MOS/NEC did not exist. The average assignment to IMRL was six months, then the technician was reassigned to work his MOS/NEC. To complicate matters, there was a lack of standardized procedures to integrate new IMRL managers into a fully productive state.
- The 1983 CNO approved IMRL managers course had not been updated to include information related to SERMIS. This resulted in IMRL personnel not being familiar with their contribution to the SERMIS interface.
- The FASO course needed to be updated on a more frequent basis because of the dynamic nature of the SE program, e.g., a 1987 course supplement issued by FASOTRAGRUPAC which included information on SERMIS had failed to reach many former students.
- Not all course instructors had "hands-on" IMRL experience. [Ref. 6: pg. 15]

A NAVAUDSVC's recommendation, which was originally scorned, instituted the Navy NEC 9590 and Marine MOS 6042. This action has made a profound, positive impact on improving the state of IMRL management from the conditions described by the 1989 Naval audit. One of the many benefits of creating the NEC/MOS, as it pertains to this question, is that being a professional field in-of-itself greatly increases the FASO instructor base. IMRL instructors have required IMRL experience and vested interest in the IMRL community.

b) Do FASO IMRL Manager courses fulfill their purpose?

This question was examined in the context of the purpose or "mission statement" of FASO, as it pertains to the three week SE asset managers course. *The one*

[11] The authors interpreted this finding to refer to personnel who are responsible for IMRL equipment sub-custodied to their specific work-center, e.g., airframes, avionics, or ordnance.

week course did not fulfill the requirements to gain the SE NEC/MOS, hence, not considered in this evaluation.

IMRL managers are taught at the FASO schools – FASOTRAGRULANT/ FASOTRAGRUPAC. The purpose of the school is to provide the Support Equipment Asset Manager with the necessary training to effectively manage SE assets on LAMS at all AMMRL program reporting activities – which sounds deceivingly simple.

Upon successfully completing the three week course of instruction (minimum of 75% on written examinations), the student will be familiar with the management of SE assets as delineated in the OPNAV 4790.2 (series) and NAVAIR 13650.1 (series) instructions. [Ref. 27:pg. 7] This specifically includes:

> ...introduction to microcomputers, Disk Operating System (DOS), SE asset management programs, Tailored Outfitting List (TOL), Calibrated Support Equipment items, Armament Weapons Support Equipment (AWSE), Individual Material Readiness List (IMRL), SE Acquisition, SERMIS reports, SE Allowancing overview, Marine Aviation Logistic Support Program (MALSP), Maritime Pre-positioned Ships (MPS), LAMS, SE physical inventory procedures, SE Transactions Reporting (TR), SE excess and deficit reporting, IMRL revisions and tailoring, SE records, SE acceptance and transfer procedures, SE repair and depot rework request procedures, and SE asset manager pass downs. [Ref. 27: pg. 8-9]

The complexity of the AMMRL program, as validated by the NAVAUDSVC, is reflected by the scope of the FASO instruction. The large volume of material prompted general comments from the survey stating, "On- the-job experience is required before attending the FASO school, otherwise, the student will be overwhelmed" or "prospective students should possess a minimum 110 GCT to attend the IMRL school". As previously stated the purpose of the SE asset managers course is "to provide training to effectively manage SE assets using LAMS" [Ref.27: pg. 7]. However during inventory audits, many IMRL managers had problems retrieving the information needed from LAMS, i.e., LAMS03 Report, which is considered a basic and essential LAMS operation. The FASO school may be taking on too great a task for the given amount of time allotted to the IMRL courses. In other words the breadth of the course may be too large to provide the necessary depth which will familiarize the student with material that can be applied and expanded on-the-job.

c) Is IMRL being managed by designated IMRL Managers?

The Navy and Marine Corps have created a MOS (6042) and NEC (9590) for IMRL managers. Figure 18 indicates those respondents designated as an IMRL Manager. Forty-two percent of personnel managing IMRL inventories are designated with the IMRL Manager MOS/NEC. This is a good proportion considering IMRL MOS/NEC is a relatively new development and management is very dependent on the work-center, collateral duty, IMRL manager who would not be designated an IMRL manager.

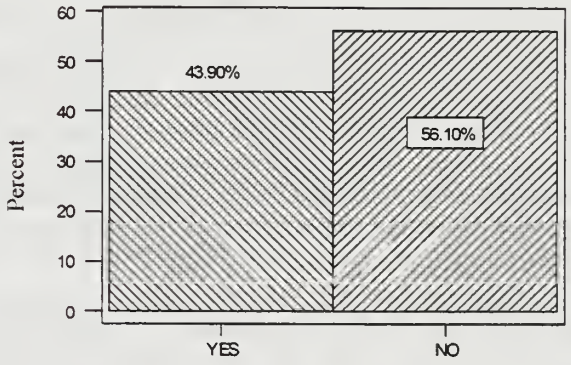


Figure 22. IMRL Manager Designation [Developed by Researchers]

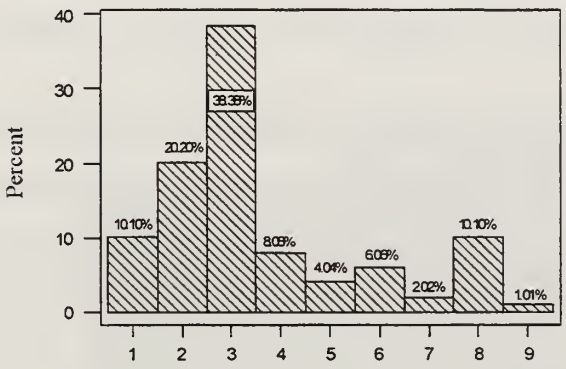
To determine if the IMRL designation significantly enhances IMRL management practices, Figure 22 was cross tabulated on SOP use, location audit execution, and IMRL location specificity.

With regard to SOP use, IMRL designees tended to use SOPs marginally more than those managers un-designated (55% vs. 49%). Based on survey data and research observations, SOP use is not a function of IMRL designation or FASO school length. SOP use (observed) was based on individual organizational skills and experience. Survey data indicate SOP use doubled after two or more years of IMRL inventory experience.

Designation did have a marginal impact on location audit execution. Location audits increased nearly 20% when the IMRL managers were designated as such.

d) Is it difficult to attend FASO IMRL Manager Courses?

There are 160 seats per year offered by FASOTRAGRULANT and 126 seats per year offered by FASOTRAGRUPAC [Ref. 27: pg. 5].[12] The course is offered at many locations as demonstrated by Figure 19. This figure breaks down survey respondents by school attended.



Legend:
1. Detatchment Atsugi
2. Detatchment Cherry Point
3. Detatchment North Island
4. Site Cecil Field
5. Detatchment El Toro
6. Detatchment Whidby Island
7. Detatchment Miramar
8. Norfolk
9. Subic

Figure 23. IMRL School Location and Attendance [Developed by Researchers]

Based on the above statistics, the interviews conducted during on-site visits, and the comments/concerns section of our survey, getting school quotas are available. It appears any limiting factors are the units not wanting to fund or lose personnel to attend school.

[12] Maximum students per class: FASOTRAGRULANT – 10, FASOTRAGRUPAC – 9, Minimum students required to convene class – LANT/PAC –3/3.

e) What length of schools are IMRL Managers attending?

Figure 20 shows which FASO course the respondents attended. There is a one week and three week course offered in IMRL Management. The survey indicated a majority attended the one week course. Ideally this course targets personnel who are responsible for a small number of assets, e.g., the IMRL manager responsible for work-center assets as a collateral duty. This individual is responsible to maintain inventory control and provide input for LAMS concerning his work-center/division, but the actual LAMS manipulation is conducted by the centralized IMRL manager.

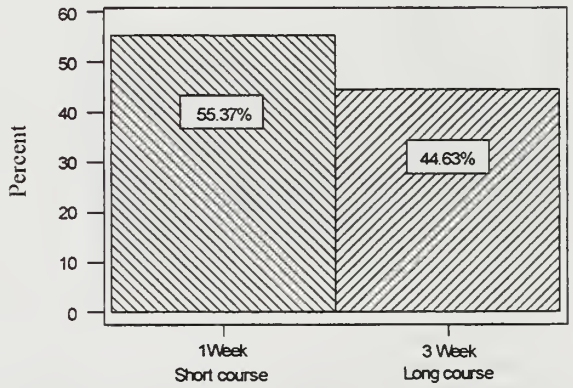


Figure 24. IMRL Course Length [Developed by Researchers]

f) What kind of marks do alumni give the FASO Schools on the IMRL Managers Course?

Alumni were asked if FASO offers instruction on inventory procedures and if the alumni felt the instruction adequately prepared them to conduct inventories. The school received high marks in both of these areas. (See Figure 21 and Figure 22)

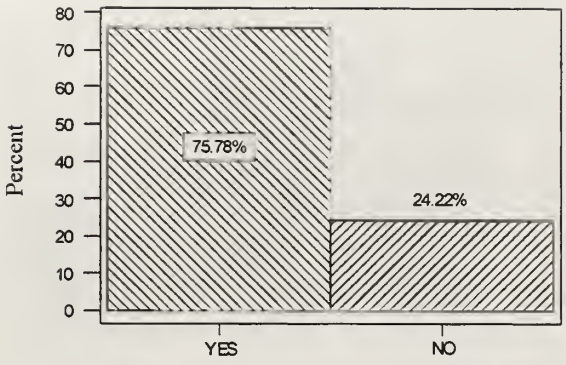


Figure 25. Prepared for Inventory Management [Developed by Researchers]

Research on course material was found to be concise, well-written and organized. The instruction on inventory procedures does focus on the use of barcode scanners. However, in light of previous discussions regarding disuse of barcoding equipment, there exists a teaching or learning gap in the instruction. The break-down is due to two factors:

- •Barcode technology is being taught but is not being exercised in the Fleet.
- There are not adequate written IMRL inventory directives to base the IMRL managers course teachings.

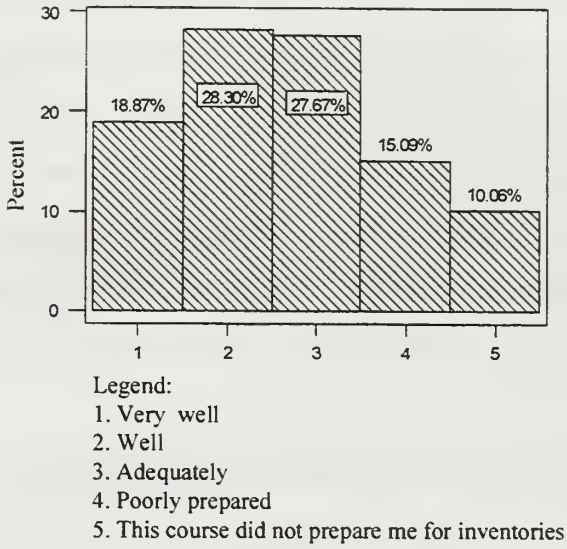


Figure 26. Degree of Inventory Preparation [Developed by Researchers]

C. CHAPTER CONCLUSION

The people working IMRL at all levels are dedicated, intelligent, and know their business. However from survey comments/concerns and interviews, IMRL managers feel unappreciated. IMRL is not well understood by the leadership appointed over them. The professionals working IMRL understand IMRL Management is a complicated field demanding exceptional organizational skills.

The good news is, because of the professional career field being established, there is a growing network which has the vested interest to improve the image, procedures and management of IMRL. This network is not yet communicating openly, well organized or formally established from a strategic vantage point. There are issues such as the barcode technology that have been stifled. Managers did not want to be identified that they are not using the technology – but the indicators of non-use were unanimous. This issue, clearly not a recent revelation, has just recently surfaced with the upper level AMMRL program managers. Rhetorically speaking, "Are the IMRL Managers wrong to not use the barcode equipment?" Those working the program usually have the best perspective on such

matters. That is not to say that barcode technology has no place in IMRL management. The IMRL managers intuitively know that the procedures and technology provided is not complete. Unit managers are trying to fulfill the requirements as they are specified in the directives but are left to devise procedures when there are none or the written procedures are not the most efficient means.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. PROBLEM INTRODUCTION: CAUSE AND EFFECT

The Common Support Equipment budget has been reduced by more than 27% over the past two years. Defense of CSE dollars is difficult because the utility of CSE is immeasurable. SE plays a critical – yet unglamorous – role in aircraft material readiness. The ability to quantify and defend that role has been the nemesis of CSE integrated program team members over the past two budget cycles. Since inventory validity or the credibility of reported inventories is a major consideration in the complex process of sound AMMRL investment decisions and can generate a basis for defense against further reductions in funding, inventory validity was the focus of this study. If the Fleet's SE inventory validity is within acceptable limits, then the Fleet's input to the re-capitalization decision support system is valid. If the Fleet's inventory validity is poor, then the Fleet's buyout input is suspect.

Current AMMRL program directives do not define acceptable inventory validity percentages between on-hand inventories and SERMIS records. However, the 72.4% mean inventory validity discovered during this research does not provide justification for increased funding nor does this value provide any insight as to the impact of SE on aircraft material readiness.

The following conclusions and recommendations are not "band-aids" for CSE. These issues must be addressed strategically to better construct stronger budget defenses in the future. Four conclusions emerged from this study. The areas of focus are SE Organization, SE Metrics, SE Methods and SE Directives.

Considering the restrictive and shrinking fiduciary environment DoD operates in, resolution of these four root causal factors of poor validity may be realized without major capital investment. The knowledge and experience base, organic to the AMMRL organization, is characterized by a motivated (designated) career workforce which has a vested interest and potential longevity to nurture decisions to fruition. The education of IMRL managers is established and ongoing. The FASO schools they attend are organized

and respected Fleet-wide. Finally, the information management systems – LAMS and SERMIS – although not well interfaced are established and competent. These strengths enhance the AMMRL program's re-engineering efforts aimed at improving inventory validity and the AMMRL program as a whole.

B. RESEARCH CONCLUSIONS AND RECOMMENDATIONS

Each conclusion is addressed by asking a strategic question that should be asked by AMMRL stakeholders and decision makers. Recommendations following the question address each issue based on research findings.

1. Conclusion/Recommendation #1

a) Conclusion: The Support Equipment community is dependent upon two, distinct organizations with conflicting missions that inhibit total IMRL asset visibility and ultimately degrade the SE decision support system.

The AMMRL community is defined by two primary organizations. They are the SE IPT and the "users." SE IPT is composed of NAVAIR, NAWC, and ASO. This IPT is responsible for the procurement and life-cycle management of all IMRL equipment. They fulfill their role by applying "user input," in the form of ATRs and SODARs, to the requirements of the AMMRL program. The SERMIS source data base is their primary decision support tool.

The second organization, the "users," are all intermediate and organizational maintenance activities responsible for IMRL equipment. This organization is concerned with managing, maintaining, and ensuring adequate numbers of IMRL assets are available to accomplish the mission. They use LAMS to manage local IMRL inventories.

To accomplish their respective missions, both organizations have, by necessity, developed two distinctive and conflicting cultures. SE management has a deliberate culture whose SE requirements are driven and governed by AMMRL program mandates. The users, on the other hand, have an emergent culture. This culture has

evolved from a IMRL manager's quest to survive in a complex environment with loosely bound guidance and directives. Although management information system implementation and instruction efforts have expanded their knowledge base substantially, precise instruction on inventory management is noticeably insufficient. IMRL managers are recognized (negatively) only when support equipment attributes to degraded aircraft material readiness or when support equipment is missing and leads to a survey.

The user's culture becomes very important when grafting a strategy to bridge the gap between the operational and strategic organizations, because the patterns that exist typically are manifestations of that culture. The culture affects how strategic issues are framed and placed on the agenda in the first place, and subsequently which strategy options are given serious consideration [Ref. 28: pg.131]. Creation of the IMRL manager MOS/NEC has a profound impact on the user culture, but, other actions are required to bridge the gap between the support equipment IPT members' and user's culture.

b) Recommendation: How should the AMMRL community organize to better answer these strategic issues?

These two organizations are tightly interconnected to the point where changes made anywhere reverberate unpredictably – and often chaotically throughout both organizations. This uncertainty and interconnectedness requires a two-fold response. First, both organizations must come together and develop a strategic plan that addresses metrics, methodology, and directives needed to increase inventory validity. Second, they must develop rationales necessary for adopting and implementing their strategies. The forum of choice is a strategic planning exercise with a process facilitator. A skilled facilitator is helpful in moving a strategic planning process along and frees key leaders to participate without worrying about managing the group process. Strategic planning will provide a set of concepts, procedures, and tools designed to help SE equipment IPT members and users to think and act strategically on behalf of their respective organization and organization's stakeholders.

The goal of the strategic planning group should be to device methods in which the support equipment community rewards the desired results. An example is to assign not only responsibility but authority to intermediate commands below the SECA level to provide training and inspect reporting custodians . Functional wing and IMA support equipment personnel presently provide assistance in processing transactions and liaison between the SECA and reporting custodian level. However, their authority to hold IMRL managers accountable for on-hand inventory is very limited. The short-term effects of empowering the intermediate level managers would decrease SECA oversight responsibilities and increase inventory validity. The long-term impacts would give more importance to inventory practices and assist in transforming the user's culture.

2. Conclusion/Recommendation #2

a) Conclusion: The AMMRL program has no quantifiable metrics upon which SE management performance can be measured. The absence of metrics tying inventories to material readiness further precludes an accurate means to defend CSE budgets.

> When you can measure what you are speaking about and express it in numbers, you know something about it; but when you cannot measure, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of a science.
>
> -Lord Kelvin

Why are metrics important? Metrics measure progress. If SE does not have *useful* metrics by which to measure performance, there is no way to determine if the SE system is effective or improving [Ref. 29: p.56]. The absence of metrics are the very reason why IPT members cannot justify funding nor argue against funding cuts. If the AMMRL program can demonstrate high inventory validity percentages across their units with significant deficits, budget justifications have merit.

b) Recommendation: What metrics should be used to quantify SE management performance while providing the justification for funding arguments?

A metric deemed relevant and addressed in this research is inventory validity. Validity is a metric directly measuring an IMRL manager's performance. High inventory validity on both LAMS and SERMIS is desirable for decision makers to accurately allocate and re-distribute equipment.

Metrics must be established that can show variations in inventories or demands on the inventory system such as "re-distributable assets on hand," "deficits not on hand/on order," GIA, location validity, etc. These types of metrics give visibility of IMRL assets where by the allocators can either efficiently redistribute or have quantifiable figures to justify a budget increase. This information can just as effectively be used to reinforce budget reclamas if an increase is not possible.

3. Conclusion/Recommendation #3

a) The Fleet's inventorying methods are duplicative, conflicting, and impose disjointed requirements upon Fleet reporting custodians.

A word of caution. The goal is to obtain an inventory baseline meeting the performance criteria of the agreed upon inventory validity metric. Following the publishing of Naval Audit results, Fleet-wide wall-to-wall inventories were directed with the intent of achieving a baseline. As evidenced by this research, this directive did not achieve the desired inventory validity because units did not have the proper knowledge or tools to conduct an inventory. Therefore, a stop-gap measure such as an immediate wall-to-wall inventory *is not* recommended. Referring back to Mr. Littrell's quote,

> Inventorying is a complicated process. Individuals require detailed procedures and need to be involved in four to five inventories before they really become proficient at the process. I have been involved in inventories where the desired 98% validity was not achieved, but felt the experience was worthwhile because personnel received valuable training on how to conduct inventories. [Ref. 22]

Inventory methods are duplicative because the Fleet is trying to give the appearance of the use of barcoding equipment by exerting the time and effort to label IMRL assets but do not using the barcoding equipment to conduct the inventory. This requires a duplicative ad-hoc means of doing a manual inventory – ad-hoc in the sense that there are no written procedures, thus requiring IMRL managers to devise their own manual inventorying procedures.

Methods are conflicting because directives require but do not define the intent nor provide the methods of a wall-to-wall inventory. To further complicate the process, other directives require units follow a schedule for a cyclic inventory. The duplicative and conflicting requirements result in disjointed methods. In other words, units are controlling their inventories by several incomplete methods instead of by one universal, efficient process. Every action taken should have a positive effect on inventory control.

b) Recommendation: What inventory control methods should the AMMRL community use?

Inventory control is a science unto itself. There are different approaches applicable to the inventorying process – barcode technology, manual inventories, wall-to-wall, cyclic are to name a few. Developing an approach tailored to the AMMRL program and its mission should include experts in the area of inventory control, e.g. contractors and the management assist teams located within each aircraft wing. It must be stressed that the chosen method of inventory control must have buy-in from the key-stake holders, i.e., reporting custodians at the O and I levels. Consensus on the approach is important and worth the time it will take to achieve. This decision has significant, long-term impact. Once a method is agreed upon, directives must be written in accordance with that method. If an existing requirement has no value added – delete the requirement! If pertinent details are missing identify and document the missing details. Ensure documented changes are incorporated into inventory instructions.

4. Conclusion/Recommendation #4

a) AMMRL directives do not define nor do they include adequate metrics or methods to measure performance nor standardized procedures for inventory management and control.

Both the NAMP and the NAVAIRINST 13650.1_ require a wall-to-wall inventory but neither offer a definition nor adequate procedures for performing a wall-to-wall inventory. The directives do not outline procedures to verify if established goals or metrics have been achieved, e.g., procedures outlining the conduct of a validity audit. Current AMMRL program directives delegate responsibility for developing and publishing local IMRL inventory procedures to the SECA level. This current directive promotes non-standard methods and practices unique to each SECA and poses potential procedural conflicts.

b) How should the directives be written?

Create a universal, inventory desk-top procedures manual for IMRL managers. A published, sole source document would provide standardization and focus program direction. These procedures should be all encompassing. Mangers should not have to query nor maintain multiple references for inventory guidance. This document should be written by a team of stakeholders from the AMMRL program in conjunction with external inventory control experts.

C. AREAS FOR FURTHER RESEARCH

1. What are the holding costs associated with excess IMRL equipment held by O and I level managers?

There are holding costs associated with excess IMRL because excesses must be stored, inventoried, managed, and maintained. Determine the scope of the excesses and the associated costs they incur in the AMMRL program. Additionally, determine if these costs impact the support of SE and aircraft material readiness.

2. How effectively is AMMRL managing the disposition and retirement of obsolete IMRL equipment?

Research the process to dispose of obsolete IMRL. Describe how an item is determined to be obsolete, actions taken to request disposition instructions, and the actual disposal of SE. Additionally, determine the costs associated with SE disposal.

3. What is the feasibility of creating a system linking SE condition and inventory information and aircraft material readiness data with the SERMIS source database?

The intent of this system would be to link the SE posture, condition and inventory, to aircraft material readiness. This link would enhance re-capitalization decision support and provide definitive metrics to argue for funding.

D. SUMMARY

This research points out AMMRL inventory management systems are only as good as the inventory information input. This cause-and-effect relationship is at the heart of the cultural conflict which continues to fight bridging-the gap from operational to strategic planning. Ideally, SE IPT members could rely on SERMIS to forecast future SE requirements and tailor to optimal on-hand inventory levels. However, the Fleet's operational IMRL managers abide by the "just-in-case" philosophy – making IMRL inventories unmanageable. Inventory record keeping is further degraded by a lack of standardized inventory direction. Failure to overcome this culture has degraded SERMIS as a decision support system, hampered re-capitalization decisions, and degraded the ability to determine how SE, or the lack there-of, impacts aircraft readiness.

LIST OF REFERENCES

1. Light, Walter, interview, COMNAVAIRSYSCOM PMA-260A, April 15, 1996.
2. Naval Air Warfare Center (Aircraft Division), World Wide Web Homepage, http://lakehurst1.navy.mil/www/csepg1.htm, Lakehurst, NJ, 15 November 1996.
3. Wigfall, Victor, COMNAVAIRSYSCOM PMA-260C36, electronic mail, Washington D.C., 15 November 1996.
4. Kaminski, Paul G., Under Secretary of Defense for Acquisition and Technology, Keynote Address to the 12th National logistics Symposium and Exhibition, Alexandria, Virginia, 31 October 1995.
5. Aviation Support Equipment (PMA-260), Program Operating Guide, October 1994.
6. Naval Audit Service Report, Management of the Support Equipment Program 028-C-89, 6 April 1989.
7. Commander Naval Air Systems Command, NAVAIRINST 13650.1C, Aircraft Maintenance Material Readiness List Program Instruction, 16 January 1992.
8. Greco, Lou, Non-Avionics Support Equipment Integrated Product Team Leader, facsimile, Naval Air Warefare Center (Aircraft Division), Lakehurst, NJ, 17 April 1996.
9. Jansen, Robert L., Handbook of Inventory Management, Prentice-Hall, Inc., Englewood, N.J., 1987.
10. Leunig, David, Non-Avionics Support Equipment Integrated Product Team Member, Naval Air Warfare Center (Aircraft Division), interview, Lakehurst, NJ, 30 May 1996.
11. Chief of Naval Operations ltr 4790 ser 514/9U595626 dated 21 November 1989.
12. Dougherty, Mike, Commanding Officer, Naval Air Warfare Center (Aircraft Division), Lakehurst, NJ, Support Equipment Briefing, 17 April 1996.
13. Chief of Naval Operations, OPNAVINST 4790.2F, Naval Aviation Maintenance Program, 1 June 1995.
14. McCutcheon, Kevin, COMNAVAIRSYSCOM code PMA-260C36, AMMRL
15. Naval Aviation Maintenance Office, Support Equipment Resources Management Information System (SERMIS) User Manual, NAMO M-050 UM-04, 1 April 1994.
16. Commander, Naval Air Systems Command, Local Asset Management System (LAMS) Version 2.4 User Manual, December 1995.
17. Chief of Naval Operations code N09B22, U.S. Navy Public Affairs Library, The Standard Navy Distribution List, http://www.navy.milnavpalib/questions/sndl-web.html, June 1996.

18. Commander Naval Air Force, United States Pacific Fleet, COMNAVAIRPACINST 13650.2, Aircraft Maintenance Material Readiness List (AMMRL) Program, 8 June 1993.

19. Commander Naval Air Force, United States Pacific Fleet, COMNAVAIRPACINST 13650.2A, Aircraft Maintenance Material Readiness List (AMMRL) Program, draft.

20. Commandant of the Marine Corps, MCO 4400.177A, Change 1, Marine Corps Aviation Supply Desk-Top Procedures, 24 November 1994.

21. Aviation Intermediate Maintenance Department North Island, The New AIMD IMRL Division Standard Operating Procedures, draft, 1 June 1995.

22. Fleet Aviation Specialized Operational Training Group, Instructor Guide for Support Equipment Asset Manager, E/D-555-0026, (New: November 1991, Revised: June 1994) Change-1 August 1995.

23. Littrell, Wilburn, 2d Marine Aircraft Wing Management Assist Team, interview, 17 January 1997.

24. Naval Supply Systems Command, NAVSUP P567, Automated SNAP I Supply Procedures, Vol. 1, Logistics and Inventory Management, March 1990.

25. Commander, Naval Air Force, United States Pacific Fleet, COMNAVAIRPACINST 4790.44B, Aircraft Organizational and Intermediate Maintenance Department Evaluation/Assistance/Inspection Program Guidelines 31 August 1995.

26. COMNAVAIRPACINST/COMNAVAIRLANTINST 4440.1B, Supply Operations Manual, September 1996.

27. Fleet Aviation Specialized Operational Training Group, Curriculum Outline for Support Equipment Asset Manager, E/D-555-0026 (New: November 1991, Revised: June 1994) Change-1 August 1995.

28. Bryson, John M., Strategic Planning for Public and Nonprofit Organizations, Revised Edition, Jossey-Boss Inc., San Francisco, 1995.

29. Pressman, Roger S., Software Engineering: A Practitioners Approach, 3rd Edition, McGraw-Hill Inc., New York, 1992.

APPENDIX A. FLEET SURVEY

1. Service Location [1][2]

❍ USN (1) ❍ East Coast (AIRLANT, FMFLANT) (1)
❍ USMC (2) ❍ West Coast (AIRPAC, FMFPAC) (2)

What is your rank?
[3][4]

❍ Officer (O) ❍ 1 ❍ 6
❍ 2 ❍ 7
❍ Enlisted (E) ❍ 3 ❍ 8
❍ 4 ❍ 9
❍ Warrant (WO) ❍ 5

2. At what level of maintenance do you work?
[5]
❍ Organizational (Squadron) (1) ❍ Intermediate (AIMD/IMA) (2)
❍ Type Squadron e.g. VF, HMM _____
[6]

3. How long have you been in your current billet? (Include time spent in billets subordinate to current billet)
[7]
❍ less than 6 months (1)
❍ 6 months to 1 year (2)
❍ 1 to 2 years (3)
❍ greater than 2 years (4)

4. How much time (total) have you spent in IMRL inventory management?
[8]
❍ less than 6 months (1)
❍ 6 months to 1 year (2)
❍ 1 to 2 years (3)
❍ greater than 2 years (4)

5. Do you have the IMRL Manager specialty?(USMC 6042 MOS/Navy 9590 NEC)
[9]
❍ Yes (1) ❍ No (2)

❍ Job title _____ ❍ Description _____
[10]
If your answer to Question #5 was "No", **do not** answer question 6.

6. IMRL School(s) attended...
❍ FASO Atsugi(1) ❍ FASO Cherry Point (2) ❍ FASO North Island (3)
[11]
❍ Short Course (one week long) (1) ❍ Long Course (3 weeks) (2)
[12]

6.a. Was instruction in inventory procedures part of this course of instruction? [13]

❍ Yes (1) ❍ No (2)

6.b. How well did FASO school prepare you for your current position? [14]

❍ Very well, (1)
❍ Well (2)
❍ Adequately (3)
❍ Poorly prepared (4)
❍ This course did not prepare me for my current position (5)

6.c. How well did this course prepare you to conduct an inventory? [15]

❍ Very well (1)
❍ Well (2)
❍ Adequately (3)
❍ Poorly prepared (4)
❍ This course did not prepare me for inventories. (5)

7. How many inventories on your entire IMRL account have you conducted or been involved? [16]

❍ None (If None, skip question #9) (1)
❍ 1 - 2 (2)
❍ 3 - 4 (3)
❍ greater than 4 (4)

8. What type of inventory(s) were performed? [17]

❍ Wall-to-wall (1)
❍ Cyclic (2)
❍ Other _____ (3)

9. What is your unit goal for time to complete the inventory performed in Question #8? (Time to complete is defined as the time from start of physical count and complete when all discrepancies are researched, corrected or surveyed.) [18]

❍ 2 days (1)
❍ 7 days (2)
❍ 30 days (3)
❍ Other _____ (4)

10. On average, how often are IMRL inventories conducted in your unit? [19]

❍ 1 per quarter (1)
❍ Semi-annual (2)
❍ Annual (3)
❍ Once every three years (4)

❍ Other _____ (5)

11. What was the completion date of the last inventory? (e.g. 6 Aug 96)
[20]
❍ _____

12. What were the financial adjustments (surveys) on your last inventory? (Dollar figure computed by adding gains and losses)
[21]
❍ 1% of total inventory worth (1)
❍ Less than $1 million (2)
❍ Less than $250 thousand (3)
❍ Less than $50 thousand (4)
❍ Unsure of figure (5)

13. Do you use a published Standard Operating Procedures (SOP) for inventory execution?
[22]
❍ Yes (1) If 'yes', cite reference (SqdnO, MaintInst)
_____
❍ No (2)

14. How do you announce inventory dates to customers? Check all the appropriate responses?
[23]
❍ Word of mouth (1)
❍ Plan of the Day (2)
❍ Maintenance meeting (3)
❍ Letter (4)
❍ Other _____ (5)

15. To what extent do you restrict (freeze) use of IMRL assets during the inventory counting/bar code scanning process?
[24]
❍ Business as usual (1)
❍ IMRL assets may not move or change status (2)
❍ IMRL assets may move or change status if the asset is tracked through a control desk (3)
❍ Once a particular asset has been scanned it may move or change status (4)
❍ Other_____ (5)

16. Which method do you use to account for material which must be checked out or have its status changed during the count/scanning process?
[25]
❍ I don't do anything different (1)
❍ I have a control desk which monitors assets that change status both **before** the line item has been counted and **after** the line item has been counted (2)
❍ I write down which assets were checked out or changed status during the inventory (3)

❍ Absolutely nothing is checked out or has its status changed during an inventory (4)

17. How specific are your IMRL locations?
[26]
❍ Specific locations are assigned with a painted shadow (1)
❍ Location identifies 1 meter X 1 meter area (2)
❍ Location by room number (3)
❍ Location by work center (4)
❍ Location by squadron (5)

18. The purpose of a location audit is ensure the physical location of material corresponds to the location recorded on the data base. Do you perform a location audit before you count assets?
[27]
❍ Yes (1)
❍ No (2) If 'No', skip Question #19

19. Which actions of a location audit do you perform as a preliminary step to an inventory count?
[28]
❍ Audit **every** location to ensure there is not any material misplaced. Return misplaced material to proper location. (1)
❍ I do a location audit when I do not have time to do an inventory. (2)
❍ Audit a percentage of locations to ensure there is not any misplaced material. If no material is misplaced conclude the other locations do not contain misplaced material (3)

20. How do you reconcile/verify material that is on loan, being calibrated, or in work at an intermediate maintenance activity (IMA)/Depot before counting assets?
[30]
❍ Personally call activity and have them do a physical check (1)
❍ Maintain forms with a signature from activity that has the asset (2)
❍ Trust LAMMS records are correct (3)

21. What is your unit's attitude toward submitting surveys?
[31]
❍ Submitting almost zero surveys indicates good inventory management. (1)
❍ A constant but small number of surveys indicates good inventory management (2)
❍ Surveys are avoided (3)
❍ A surge of surveys is expected after inventories (4)

22. What best describes your experience with submitting surveys?
[32]

❍ It was difficult to find out the process and the chain of command is unsure/uncomfortable approving the surveys. (1)

- ❍ I was unsure of the process but easily found the information and my unit expedited the survey up the chain of command (2)
- ❍ I am very familiar with the process and my unit will expedite the survey up the chain (3)
- ❍ I am familiar with the process but my unit discourages submitting surveys. (4)
- ❍ I have never submitted a survey. (5)

23. How adequate are your allowances? Consider allowances as though you had 100% on-board and serviceable. Do not consider assets in excess or deficit of the allowance.

[33]

- ❍ My allowances meet our operational tempo very well. (1)
- ❍ My allowances are excessive. I have to manage a lot of assets that are never used. (2)
- ❍ My allowances are short. Even at 100% fill we would have trouble meeting operational tempo. (3)
- ❍ My allowances contain both excess and shortages. (4)

24. To whom do you provide input on your priorities for IMRL equipment replacement/recapitalization which is considered at the APN-7 Conference? (The APN-7 Conference considers fleet input in order to better use APN-7 dollars to buy replacement SE.)

[34]

- ❍ TYCOM/SECA (1)
- ❍ Wing (2)
- ❍ AIMD (3)
- ❍ Group (4)
- ❍ Don't know who to submit priorities to (5)

25. What are your **three** (3) highest SE priorities for replacement?

Nomenclature	CAGE/Part Number or NSN
1.	
[35]	
2.	
[36]	
3.	
[37]	

Please provide your comments/concerns on any topic dealing with support equipment. Your insight is aggressively sought and greatly appreciated. Please use reverse if necessary.

Thank you for your time and effort in completing this survey.

APPENDIX B. FLEET SURVEY SUMMARY

The Support Equipment survey [Appendix A] was mailed to two hundred forty (240) commands in the Navy and Marine Corps. The population include active IMAs and Fleet squadrons only. Reserve IMAs and squadrons to include training commands, were excluded from this survey pool. Table B- 1 shows a break down of those units included in the mail in survey.

US Navy			US Marine Corps	
Squadrons		135	Squadrons	68
AIMDs		27	MALS	10
Air Stations	14			
Carriers	13			
USN Subtotal		162	USMC Subtotal	78
			Total Units Surveyed	**240**

Table B- 1. Survey Summary - Unit Breakdown

To identify possible weighting considerations from respondents, ratios of Navy units to Marine Corps units surveyed are compared to response ratios of the same to determine if any undue influence was exerted by one service or another or squadrons over IMAs. These ratios of expected response are tabulated in Table B- 2 below.

Expected		USMC		
		Squadron	MALS	Total
USN	Squadron	2.0		
	AIMD		2.7	
	Total			2.1

Table B- 2. Expected Response Ratios

Actual survey response is detail below in Table B- 3.

US Navy		US Marine Corps	
Squadrons	152	Squadrons	75
AIMDs	40	MALS	18
Air Stations ..			
Carriers ..			
USN Subtotal	192	USMC Subtotal	93
		Total Units Surveyed	**285**

Table B- 3. Actual Survey Response

Ratios of actual survey respondents are tabulated below in Table B- 4.

Actual		USMC		
		Squadron	MALS	Total
USN	Squadron	2.0		
	AIMD		2.2	
	Total			2.1

Table B- 4. Actual Response Ratios

Although the response rate was not as high as expected, the ratio returned was sufficient and representative of Fleet units surveyed to use this data with confidence. Each question of the mail-in survey is restated and the tabulated responses follow.

1. Service
   - ❍ USN
   - ❍ USMC

   Location
   - ❍ East Coast (AIRLANT, MARFORLANT)
   - ❍ West Coast (AIRPAC, MARFORPAC)

Service	*f*	%
US Navy	194	67.6
US Marine Corps	93	32.4
Total	287	100.0

Non-responses = 2

Table B- 5. Survey Respondents By Service

Location	*f*	%
East Coast	118	48.4
West Coast	126	51.6
Total	244	100.0

Non-responses = 45

Table B- 6.1Survey Respondents By Location

What is your rank?

❍ Officer (O) ❍ 1 ❍ 6
❍ 2 ❍ 7
❍ Enlisted (E) ❍ 3 ❍ 8
❍ 4 ❍ 9
❍ Warrant (WO) ❍ 5

Service	USN		USMC	
Rank	*f*	%	*f*	%
E-2	1	0.5%	2	2.2%
E-3	3	1.6%	7	7.6%
E-4	5	2.6%	19	20.7%
E-5	74	39.2%	13	14.1%
E-6	60	31.7%	24	26.1%
E-7	8	4.2%	6	6.5%
E-8	2	1.1%	1	1.1%
E-9	1	0.5%	0	0.0%
WO-1	1	0.5%	2	2.2%
WO-2	8	4.2%	1	1.1%
WO-3	0	0.0%	3	3.3%
WO-4	2	1.1%	2	2.2%
O-1	6	3.2%	2	2.2%
O-2	8	4.2%	6	6.5%
O-3	8	4.2%	4	4.3%
O-4	2	1.1%	0	0.0%
Total	189	100.0%	92	100.0%

Table B- 7. Respondent Rank

2. At what level of maintenance do you work?

❍ Organizational (Squadron) (1) ❍ Intermediate (AIMD/IMA) (2)

❍ Type Squadron e.g. VF, HMM _____

Service	USN		USMC	
Unit	*f*	%	*f*	%
O- Level (Squadrons)	123	78.3	67	79.8
I-Level (IMA/MALS)	34	21.6	17	20.2
Total	157	99.9	84	100.0

Non-responses: USN=35, USMC=9

Table B- 8. Level By Service

3. How long have you been in your current billet? (Include time spent in billets subordinate to current billet)

❍ less than 6 months (1)

❍ 6 months to 1 year (2)

❍ 1 to 2 years (3)

❍ greater than 2 years (4)

Service	USN	USMC	Total
less than 6 months	28	17	45
6 months to 1 year	46	62	62
1 to 2 years	63	25	88
greater than 2 years	56	35	92

Table B- 9. Experience Levels

4. How much time (total) have you spent in IMRL inventory management?
   - ❍ less than 6 months
   - ❍ 6 months to 1 year
   - ❍ 1 to 2 years
   - ❍ greater than 2 years

	USN	USMC	Total
less than 6 months	39	12	51
6 months to 1 year	50	17	67
1 to 2 years	49	28	77
greater than 2 years	56	35	92

Table B- 10. IMRL Experience

5. Do you have the IMRL Manager specialty?(USMC 6042 MOS/Navy 9590 NEC)
   ❍ Yes ❍ No

	USN	USMC	Total
Yes	79	46	125
No	114	46	161

Table B- 11. IMRL Designation

6. IMRL School(s) attended…

❍ FASO Atsugi ❍ FASO Cherry Point ❍ FASO North Island

❍ Short Course (one week long) ❍ Long Course (3 weeks)

	USN	USMC
Atsugi (1)	5	5
Cherry Point (2)	2	18
North Island (3)	33	5
Cecil Field (4)	5	3
El Toro (5)	0	4
Whidbey Island (6)	6	0
Miramar (7)	2	0
Norfolk (8)	10	0
Subic Bay (9)	0	1
Unknown	65	36
Totals	128	72

Table B- 12. School Cross Section

6.a. Was instruction in inventory procedures part of this course of instruction?

❍ Yes ❍ No

	USN	USMC	Total
Yes	58	27	85
No	5	9	14

Table B- 13. Inventory Procedures

6.b. How well did FASO school prepare you for your current position?

- ❍ Very well,
- ❍ Well
- ❍ Adequately
- ❍ Poorly prepared
- ❍ This course did not prepare me for my current position

	USN	USMC	Total
Very well	25	4	29
Well	22	6	28
Adequately	43	15	58
Poorly prepared	12	20	32
This course did not prepare me for my current position	7	4	11

Table B- 14. Degree of Preparation From FASO

6.c. How well did this course prepare you to conduct an inventory?

- ❍ Very well
- ❍ Well
- ❍ Adequately
- ❍ Poorly prepared
- ❍ This course did not prepare me for inventories.

	USN	USMC	Total
Very well	25	5	30
Well	34	11	45
Adequately	31	13	44
Poorly prepared	11	12	23
This course did not prepare me for inventories	8	8	16

Table B- 15. Degree of Preparation for Inventories

7. How many inventories on your entire IMRL account have you conducted or been involved?

- ❍ None
- ❍ 1 - 2
- ❍ 3 - 4
- ❍ greater than 4

	USN	USMC	Total
None	14	7	21
1-2	57	33	90
3-4	48	17	65
greater than 4	74	36	110

Table B- 16. Inventories Conducted

8. What type of inventory(s) were performed?

- ❍ Wall-to-wall
- ❍ Cyclic

	USN	USMC	Total
Wall-to-wall	180	85	265
Cycic	5	1	6

Table B- 17. Type Inventory Typically Conducted

9. What is your unit goal for time to complete the inventory performed in Question #8? (Time to complete is defined as the time from start of physical count and complete when all discrepancies are researched, corrected or surveyed.)

- ❍ 2 days
- ❍ 7 days
- ❍ 30 days
- ❍ Other _____

	USN	USMC	Total
2 days	50	14	64
7 days	86	41	127
30 days	29	22	51
Other	21	12	33

Table B- 18. Unit Goal to Complete Inventory

10. On average, how often are IMRL inventories conducted in your unit?

- ❍ 1 per quarter
- ❍ Semi-annual
- ❍ Annual
- ❍ Once every three years
- ❍ Other _____

	USN	USMC	Total
1 per quarter	111	30	141
Semi-annual	33	28	61
Annual	34	33	67
Once every three years	1	0	1
Other	13	1	14

Table B- 19. Regularity of Inventories

11. What was the completion date of the last inventory?

Answers varied

12. What were the financial adjustments (surveys) on your last inventory? (Dollar figure computed by adding gains and losses)

- ❍ 1% of total inventory worth
- ❍ Less than $1 million
- ❍ Less than $250 thousand
- ❍ Less than $50 thousand
- ❍ Unsure of figure

	USN	USMC	Total
1% of total inventory worth	39	14	53
Less than $1 million	0	6	6
Less than $250 thousand	3	1	4
Less than $50 thousand	31	16	47
Unsure of figure (or $0)	112	51	163

Table B- 20. Financial Adjustments

13. Do you use a published Standard Operating Procedures (SOP) for inventory execution?

- ❍ Yes
- ❍ No

	USN	USMC	Total
Yes	107	35	142
No	81	53	134

Table B- 21. SOP Use

14. How do you announce inventory dates to customers? Check all the appropriate responses?

- ❍ Word of mouth
- ❍ Plan of the Day
- ❍ Maintenance meeting
- ❍ Letter
- ❍ Other

	USN	USMC	Total
Word of mouth	12	14	26
Plan of the Day	1	1	2
Maintenance meeting	48	26	74
Letter	17	3	20
Other	7	5	12

Table B- 22. Inventory Announcement Method

15. To what extent do you restrict (freeze) use of IMRL assets during the inventory counting/bar code scanning process?

- ❍ Business as usual
- ❍ IMRL assets may not move or change status
- ❍ IMRL assets may move or change status if the asset is tracked through a control desk
- ❍ Once a particular asset has been scanned it may move or change status
- ❍ Other

	USN	USMC	Total
Business as usual	119	56	175
IMRL assets may not move or change status	9	4	13
IMRL assets may move or change status if the asset is tracked through a control desk	17	21	38
Once a particular asset has been scanned it may move or change status	35	8	43
Other	5	3	8

Table B- 23. Asset Activity During Inventories

16. Which method do you use to account for material which must be checked out or have its status changed during the count/scanning process?

- ❍ I don't do anything different
- ❍ I have a control desk which monitors assets that change status both **before** the line item has been counted and **after** the line item has been counted
- ❍ I write down which assets were checked out or changed status during the inventory
- ❍ Absolutely nothing is checked out or has its status changed during an inventory

	USN	USMC	Total
I don't do anything different	67	22	89
I have a control desk which monitors assets that change status both before the line item has been counted and after the line item has been counted	21	17	38
I write down which assets were checked out or changed status during the inventory	76	48	124
Absolutely nothing is checked out or has its status changed during an inventory	19	4	23

Table B- 24. Accounting Method for Dynamic Equipment

17. How specific are your IMRL locations?

- ❍ Specific locations are assigned with a painted shadow
- ❍ Location identifies 1 meter X 1 meter area
- ❍ Location by room number
- ❍ Location by work center
- ❍ Location by squadron

	USN	USMC	Total
Specific locations are assigned with a painted shadow	40	28	68
Location identifies 1 meter X 1 meter area	8	11	19
Location by room number	9	7	16
Location by work center	133	44	177
Location by squadron	0	3	3

Table B- 25. IMRL Locations

18. The purpose of a location audit is ensure the physical location of material corresponds to the location recorded on the data base. Do you perform a location audit before you count assets?

- ❍ Yes
- ❍ No

	USN	USMC	Total
Yes	78	37	115
No	111	54	166

Table B- 26. Location Audits Performed

19. Which actions of a location audit do you perform as a preliminary step to an inventory count?

- ❍ Audit **every** location to ensure there is not any material misplaced. Return misplaced material to proper location.
- ❍ I do a location audit when I do not have time to do an inventory.
- ❍ Audit a percentage of locations to ensure there is not any misplaced material. If no material is misplaced conclude the other locations do not contain misplaced material

	USN	USMC	Total
Audit every location to ensure there is not any material misplaced. Return misplaced material to proper location.	67	33	100
I do a location audit when I do not have time to do an inventory.	1	2	3
Audit a percentage of locations to ensure there is not any misplaced material. If no material is misplaced conclude the other locations do not contain misplaced material	8	3	11

Table B- 27. Location Audit Actions

20. How do you reconcile/verify material that is on loan, being calibrated, or in work at an intermediate maintenance activity (IMA)/Depot before counting assets?

- ❍ Personally call activity and have them do a physical check
- ❍ Maintain forms with a signature from activity that has the asset
- ❍ Trust LAMS records are correct

	USN	USMC	Total
Personally call activity and have them do a physical check	26	8	34
Maintain forms with a signature from activity that has the asset	134	69	203
Trust LAMS records are correct	13	1	14

Table B- 28. Reconciling Methods

21. What is your unit's attitude toward submitting surveys?

- ❍ Submitting almost zero surveys indicates good inventory management.
- ❍ A constant but small number of surveys indicates good inventory management
- ❍ Surveys are avoided
- ❍ A surge of surveys is expected after inventories

	USN	USMC	Total
Submitting almost zero surveys indicates good inventory management	107	35	142
A constant but small number of surveys indicates good inventory management	55	44	99
Surveys are avoided	24	7	31
A surge of surveys is expected after inventories	4	4	8

Table B- 29. Unit Attitude Re: Surveyed Equipment

22. What best describes your experience with submitting surveys?
- ❍ It was difficult to find out the process and the chain of command is unsure/uncomfortable approving the surveys.
- ❍ I was unsure of the process but easily found the information and my unit expedited the survey up the chain of command
- ❍ I am very familiar with the process and my unit will expedite the survey up the chain
- ❍ I am familiar with the process but my unit discourages submitting surveys.
- ❍ I have never submitted a survey.

	USN	USMC	Total
It was difficult to find out the process and the chain of command is unsure/uncomfortable approving the surveys	14	11	25
I was unsure of the process but easily found the information and my unit expedited the survey up the chain of command	20	14	34
I am very familiar with the process and my unit will expedite the survey up the chain	89	37	126
I am familiar with the process but my unit discourages submitting surveys	36	8	44
I have never submitted a survey.	34	19	53

Table B- 30. Survey Submission Experience

23. How adequate are your allowances? Consider allowances as though you had 100% on-board and serviceable. Do not consider assets in excess or deficit of the allowance.

- ❍ My allowances meet our operational tempo very well.
- ❍ My allowances are excessive. I have to manage a lot of assets that are never used.
- ❍ My allowances are short. Even at 100% fill we would have trouble meeting operational tempo.
- ❍ My allowances contain both excess and shortages.

	USN	USMC	Total
My allowances meet our operational tempo very well	71	12	83
My allowances are excessive. I have to manage a lot of assets that are never used	34	10	44
My allowances are short. Even at 100% fill we would have trouble meeting operational tempo	11	20	21
My allowances contain both excess and shortages	70	49	119

Table B- 31. Allowance Adequacy

24. To whom do you provide input on your priorities for IMRL equipment replacement/recapitalization which is considered at the APN-7 Conference? (The APN-7 Conference considers fleet input in order to better use APN-7 dollars to buy replacement SE.)

- ❍ TYCOM/SECA
- ❍ Wing
- ❍ AIMD
- ❍ Group
- ❍ Don't know who to submit priorities to

	USN	USMC	Total
TYCOM/SECA	55	3	58
Wing	114	25	139
AIMD	11	18	29
Group	3	27	30
Don't know	10	17	27

Table B- 32. Input Submissions

25. What are your **three (3)** highest SE priorities for replacement?

Priorities not relevant to the approach of this study.

APPENDIX C. UNIT AUDIT SHEETS

Date: 8/23/96
Unit: IMA(N) C

Inventory v. LAMS: 71.4%
Inventory v.SERMIS: 66.7%
LAMS v.SERMIS: 95.2%
Readiness (Unscrubbed-MC): 75.6%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
149	178AS100 / Firing Circuit	66	50	66/58	0	d	d
672	21C8251G01/ Pushers, Vane S	1	1	1/1	0	0	0
670	21C8510G01/ Tester- Leak, F	4	4	4/4	0	0	0
60	PD2660/ Adapter Holding	1	1	1/1	0	0	0
57	T101597/ Tab Bender, Main	1	0	1/1	0	d	d
58	T101598/ Bending Gage, TR	1	0	1/1	0	d	d
135	T101649-101/ Brake Disk Hold	1	0	1/1	0	d	d
1616	1324AS100-1/ Swept Frequecy	6	6	6/14	0	0	0
691	21C8245G01/ Fixture Setting	5	5	5/5	0	0	0
738	21C8281G01/ Fixture Measure	3	3	3/4	0	0	0
1613	3174AS100/ Wire Tester, TT	1	1	1/1	0	0	0
1110	395842-1/ Test Set-Decode	2	2	2/2	0	0	0
1399	492-01-02/ Analyzer, Spect	1	1	5/4	d	0	d
1273	510-1054-01/ Test-Set, Inver	2	2	2/2	0	0	0
1541	854-895-54/ Ground Strap, D	1	1	1/1	0	0	0
1233	W987-00/ Extender Card	1	1	1/1	0	0	0
1990	105D3623/ Fixture, Checki	3	3	3/3	0	0	0
2198	1455AS100-1/ Test Stand Oxy	2	2	2/2	0	0	0
2007	176C2957/ Fixture Set, SU	2	3	2/1	0	e	e
1697	64A16D2000/ Test Set, GW AN	26	24	26/27	0	d	d
1757	DPPH-50/Gage Mech Force	16	16	16/22	0	0	0
				Matches	20	15	14
				Deficits	1	5	6
				Excesses	0	1	1
				% Validity	95.2%	71.4%	66.7%

Date: 9/13/96
Unit: FW(N) 1

Inventory v. LAMS: 95.7%
Inventory v.SERMIS: 95.7%
LAMS v.SERMIS: 100%
Readiness (Unscrubbed-MC): 62%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
13	74D110054-1001/Windshield	2	2	2/2	0	0	0
33	T-71561/Holding TO	1	1	1/1	0	0	0
103	74D110002-1001/Jacking BE	1	1	1/1	0	0	0
128	74D120039-1001/Fixture H	2	2	2/2	0	0	0
157	1997AS100-1/Pitot Stat	2	2	2/2	0	0	0
157	74D510001-1001/Adapter SE	1	1	1/x	0	0	0
184	61516-1/Screen Eng	2	2	2/3	0	0	0
184	74D290109-1005/Screen Inl	1	1	1/x	0	0	0
198	3221AS101-1/Set Instal	1	1	1/1	0	0	0
215	21C8208G01/Adapter Hy	2	2	2/2	0	0	0
221	21C8021G02/Pin Riggi	2	2	2/2	0	0	0
222	21C8061P01/Adapter D	1	1	1/1	0	0	0
240	2004AS100-1/Borescope	1	1	1/1	0	0	0
249	178AS310/Adapter AS	4	4	4/4	0	0	0
266	8693/Test Bench	1	1	1/1	0	0	0
299	1328AS525/Adapter AS	2	1	2/4	0	d	d
299	74D750020-1001/Adapter T	2	2	2/x	0	0	0
415	01GA000-1/Adapter Assy	1	1	1/1	0	0	0
440	G10369/Barcode	1	1	1/1	0	0	0
457	1171AS100-1/HLU256E	4	4	4/4	0	0	0
505	1517500/Tool Inse	2	2	2/0	0	0	0
525	SP548005-103/Tool Fin	5	5	5/5	0	0	0
526	665AS848/Gauge Swa	2	2	2/2	0	0	0
				Matches	23	22	22
				Deficits	0	1	1
				Excesses	0	0	0
				% Validity	100%	95.7%	95.7%

Date: 9/13/96
Unit: FW(N) 2

Inventory v. LAMS: 90%
Inventory v.SERMIS: 85%
LAMS v.SERMIS: 90%
Readiness (Unscrubbed-MC): 85.8%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
54	74D460104-1003/Grommet Set	1	1	1/1	0	0	0
74	AA-A603-101-SE4/Compressor	1	1	1/1	0	0	0
101	74D460029-1001/Fuel Tank	1	1	1/1	0	0	0
110	74D460008-1001/Adapter Kit	1	1	1/1	0	0	0
114	74D460020-1001/Adapter Set	1	1	1/1	0	0	0
125	3172AS100-1/Lock Control	3	6	2/4	d	e	e
140	2021AS118-1/Blanking Plugs	6	6	6/6	0	0	0
189	21C8208G01/Adapter Hyd	2	2	2/2	0	0	0
223	178AS310/Adapter Assy	4	4	4/4	0	0	0
226	OA-8794-USM/Maint Kit Elec	1	1	1/1	0	0	0
237	9294/Chaff Extractor	3	3	3/3	0	0	0
247	4044550-0501/Atenna, Drivers	1	2	1/1	0	e	e
293	984A-14RA/Adapter Test	2	2	1/4	d	0	e
299	74D420048-1001/Adapter Kit	1	1	1/1	0	0	0
354	55C9332/Wrench Flight	1	1	1/1	0	0	0
377	630AS100/ Fluid Service Unit	4	4	4/4	0	0	0
382	01GA000-1/Adapter Assy Grnd	1	1	1/1	0	0	0
407	G10369/Barcode Reader	1	1	1/1	0	0	0
492	SP548005-103/Tool, Fin Inst	5	5	5/5	0	0	0
495	72D401002-1001/Memory Loader	1	1	1/1	0	0	0
				Matches	18	18	17
				Deficits	2	0	0
				Excesses	0	2	3
				% Validity	90%	90%	85%

Date: 9/13/96
Unit: FW(N) 3

Inventory v. LAMS: 90%
Inventory v.SERMIS: 90%
LAMS v.SERMIS: 95%
Readiness (Unscrubbed-MC): 81.8%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
4	AMBEU8463/Gun Mounti	2	2	2/2	0	0	0
28	74D290002-1001/Adapter Ho	2	2	2/2	0	0	0
37	62649/Adapter Assy	1	1	1/1	0	0	0
54	74D460104-1003/Grommet Se	1	1	1/1	0	0	0
65	74D140004-1003/Set Riggi	1	1	1/1	0	0	0
94	74D460019-1001/Tool Set I	1	1	1/1	0	0	0
189	21C8208G01/Adapter Hy	2	2	2/2	0	0	0
199	21C8079G01/Screen Wa	1	1	1/1	0	0	0
252	178AS320/Adapter Te	2	1	4/4	d	d	d
256	DMC498-1001/Repair Set	1	1	1/1	0	0	0
267	39-2582-001/Belt Tensi	1	1	1/1	0	0	0
268	72P100028-1001/Test Set T	2	2	2/2	0	0	0
271	1328AS525/Adapter As	1	1	1/4	0	0	0
292	984A-14RA/BRU-32 Aux	1	1	1/4	0	0	0
298	74D420048-1001	1	1	1/1	0	0	0
339	XX6504700/Kit Hydr	2	1	2/2	0	d	d
353	X55C9332/Wrench F	2	2	2/1	0	0	0
376	630AS100-11/Fluid Serv	4	4	4/4	0	0	0
406	G10369/Bar Code Reader	1	1	1/1	0	0	0
424	1171AS100-1/HLU-256/E	4	4	4/4	0	0	0
				Matches	19	18	18
				Deficits	1	2	2
				Excesses	0	0	0
				% Validity	95%	90%	90%

Date: 11/12/96
Unit: IMA(N) D

Inventory v. LAMS: 80%
Inventory v.SERMIS: 65%
LAMS v.SERMIS: 90%
Readiness (Unscrubbed-MC): 70.9%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
2503	100-473906-001/Bench Test Set	2	2	2/2	0	0	0
2139	30-01/Indicator, Servo	3	3	3/3	0	0	0
1491	3670485-1/Bridge, Micing	1	1	1/1	0	0	0
1880	522-4254-001/Test Set Discr	2	2	2/1	0	0	0
2416	622-5286-001/Dual Servo Amp	2	2	2/2	0	0	0
2646	622-7748-001/Test Set Adap	1	1	1/2	0	0	0
2083	8322/Attenuator, Fix	1	1	1/1	0	0	0
2426	C-84082/Fixture, Test L	3	4	3/3	0	e	e
1553	LT5258-01-01/Cable Assy	1	1	1/1	0	0	0
2711	716051/Adapter Kit	1	0	1/1	0	d	d
1116	1525-383 & 9259430 & GP-10S & 14-76011-3	8	8	1/1	0	0	e
1134	21C5694G02/Adapter, Hoisting	1	1	7/9	d	0	d
1473	296928-1/APU/ECU	7	7	6/8	d	0	e
537	A02GS058-2A/Bench Test Set	1	1	1/1	0	0	0
165	K604610-2/Set-Strut Assy	2	2	2/2	0	0	0
365	RDBTT8191/Extracto, Modu	1	1	1/1	0	0	0
3000	BR2J/Milling Machine	1	0	1/1	0	d	d
3215	120D157/Adapter Rings	1	1	1/1	0	0	0
2905	74D750006-1002/Adapter Hoist	27	33	27/33	0	e	e
2781	T5-8008-106-00/cable tensioner	38	38	38/43	0	0	0
				Matches	18	16	13
				Deficits	2	2	3
				Excesses	0	2	4
				% Validity	90%	80%	65%

Date: 11/12/96
Unit: RW(N) 1

Inventory v. LAMS: 90.4%
Inventory v.SERMIS: 61.9%
LAMS v.SERMIS: 66.6%
Readiness (Unscrubbed-MC): 62%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
230	630AS100/Fluid Service Unit	2	2	2/2	0	0	0
104	3218AS121-1/Test Set	0	0	3/3	d	0	d
173	361-046-001/Fuel Qty	0	0	0/1	0	0	0
246	1876AS100-1/Gauge, Fuel	0	0	2/2	d	0	d
250	HT900B/Nitro06 Heating T	0	0	1/1	d	0	d
251	1610AS100-2/Grounding S	0	0	0/0	0	0	0
55	70700-20403-046/Positioner Assy	4	4	2/2	d	0	e
59	70700-20324-047/Blade Clamp	1	1	4/2	d	0	d
64	70700-77449-049/Sump Drain H	1	1	1/1	0	0	0
65	S-B/Wrench Pitch	1	1	1/1	0	0	0
80	4203-1/Tiedown Bracket	3	3	3/16	0	0	0
81	4202-1/Tie Down Bracket	3	3	3/16	0	0	0
82	TSHB-4192-A/1-1/Tie Down Pl	6	6	6/32	0	0	0
48	70700-77340-042/Bushing Bearin	1	1	1/1	0	0	0
16	70700-77306-041/Installer Rem	2	2	2/2	0	0	0
17	70700-77403-041/Comp Sling	2	1	4/4	d	d	d
111	70700-77403-041/Comp Sling As	2	2	4/4	d	0	d
123	ST-90889-03/Accessory Drive	2	2	2/1	0	0	0
169	6226229-2/Wrench, Connect	2	2	2/2	0	0	0
203	178AS460/Firing Circuit	6	5	6/6	0	d	d
285	7790352/Extractor-Ruptu	7	7	7/7	0	0	0
				Matches	14	19	13
				Deficits	7	2	7
				Excesses	0	0	1
				% Validity	66.6%	90.4%	61.9%

Date: 8/23/96
Unit: RW(N) 2

Inventory v. LAMS: 61.9%
Inventory v.SERMIS: 9.5%
LAMS v.SERMIS: 19%
Readiness (Unscrubbed-MC): 68.5%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
45	70700-77306-041/Installer /Remo	4	4	8/8	d	0	d
70	70700-77669-041/Check/Fill Unit	1	1	0/8	e	0	e
71	70700-77544-043/Strut, Restrain	1	0	8/8	d	d	d
83	70700-77207-101/Spread Pin Tem	5	5	9/9	d	0	d
84	70700-20324-047/Blade Clamp	5	8	8/8	d	e	0
110	21C7445G01/Hose, Preservat	1	0	1/1	0	d	d
118	21C7088P01/Cover, Multiple	5	4	16/16	d	d	d
123	21C7702G01/Puller Mating	4	4	8/8	d	0	d
129	3358AS100-1/Borescope Light	8	8	13/8	d	0	d
137	TTU229AE/Test Set, Compu	2	2	0/1	e	0	e
159	371AS255-1/Fixture Disch	2	3	7/7	d	e	d
170	178AS470/Firing Circuit	3	3	8/8	d	0	d
171	178AS460/Firing Circuit	3	3	8/8	d	0	d
174	15699-0001/Adapter	8	10	9/10	d	e	e
194	DMC240 & A/Tool Kit, Inter	4	4	8/8	d	0	d
203	1836AS110/Interconnecting	3	4	8/8	d	e	d
204	70700-77543-041/Fuel Qty T	3	3	8/8	d	0	d
212	AV57-217/Wedge, 10 Degree	2	2	6/8	d	0	d
248	53D22020/Jack, A/C	4	4	8/8	d	0	d
298	7274754/Protrusion Firing	1	0	1/1	0	d	d
				Matches	4	13	2
				Deficits	15	4	16
				Excesses	2	4	3
				% Validity	19%	61.9%	9.5%

Date: 11/12/96
Unit: RW(N) 3

Inventory v. LAMS: 86.4%
Inventory v.SERMIS: 86.4%
LAMS v.SERMIS: 95.4%
Readiness (Unscrubbed-MC): 75.6%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
10	70700-77391-041/Align Loc Set	0	0	0/1	0	0	0
18	AV11-1854/Mount Plate	0	0	0/1	0	0	0
23	AV-1981/Bearing Play Check	0	1	0/1	0	e	e
43	70700-7709-041/Installer Seal	8	8	8/8	0	0	0
56	70700-77451-041/Restrainer Dam	9	9	9/8	0	0	0
61	70700-77205-041/Rig Set	8	8	8/8	0	0	0
62	70700-77408-046/Eng Lift Bar	7	7	7/8	0	0	0
69	70700-77116-041/MRB/TRB Ada	8	8	8/8	0	0	0
76	70700-77340-042 /Busslting/Beari	8	8	8/8	0	0	0
99	AVIS-9487/Tail Rotor Boot	0	0	0/9	0	0	0
109	21C7427G01/Tester Harness	0	0	0/0	0	0	0
115	5T70396/Gearbox & Turb Assy	0	0	0/0	0	0	0
138	14200000/TS Interrogator	0	0	0/1	0	0	0
139	A1976G2/Test Set-Attitude Gyro	0	0	0/1	0	0	0
142	4044550-0501/Antenna, Diversity	1	1	1/1	0	0	0
153	SE-001/Flightline Test Set	0	0	0/1	0	0	0
154	A2251G701/Test Cable-Gyro	0	1	0/1	0	e	e
160	371AS256-1/Fixture, Scanner	7	7	7/7	0	0	0
181	70700-77453-041/Test Set Blade	8	8	8/8	0	0	0
230	68AS-J1000-1/Pwr Supply-Hyd	0	0	0/1	0	0	0
265	1876AS100-1/Gauge, Fuel Adap	8	8	8/8	0	0	0
291	65A101H48-1/Band	2	1	0/15	e	d	e
				Matches	21	19	19
				Deficits	0	1	0
				Excesses	1	2	3
				% Validity	95.4%	86.4%	86.4%

Date: 11/13/96
Unit: IMA(M) A

Inventory v. LAMS: 35%
Inventory v.SERMIS: 30%
LAMS v.SERMIS: 85%
Readiness (Unscrubbed-MC): 79.1%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
962	21C8593P01/Lead, Test-Elec	7	7	7/2	0	0	0
1564	74D740076-1001/Bracket Set	4	4	2/2	d	0	e
1623	5350B001/H03 Counter, Elec	8	5	6/7	d	d	d
649	HS8687/Clamp-Blade	2	0	2/2	0	d	d
872	21C8271G01/Guide,Stator	2	2	2/2	0	0	0
929	21C8212G02/Puller-Forward	2	2	2/2	0	0	0
523	HS7532/Puller-Mech	1	0	1/1	0	d	d
308	T71560/Puller-Mech	2	0	2/2	0	d	d
2314	12B/Tester, Matl	1	0	1/1	0	d	d
2320	720C-36/Clean Work Station	2	0	2/2	0	d	d
2035	615-0275155/Meter, Foot Can	1	0	1/8	0	d	d
1310	MK20AUP/Dehydrator Pres	3	0	3/4	0	d	d
1700	HP-5005A/Signature Anal	2	0	2/2	0	d	d
1768	3082520G1/Tst Set Elect	7	0	7/7	0	d	d
1884	UG2580AB04/Test Set, Altim	3	0	3/0	0	d	d
1849	74D050050-2503/Cable Assy	4	4	4/0	0	0	0
2078	517AS300/Hoisting Unit	2	2	2/2	0	0	0
2085	74D750009-1001/Support Cradle	2	2	2/4	0	0	0
2223	1245AS100-1/Sling, A/C	3	4	2/4	d	e	e
1157	1804-5010G1/Test Set Assy	1	0	1/1	0	d	d
				Matches	17	7	6
				Deficits	3	12	12
				Excesses	0	1	2
				% Validity	85%	35%	30%

Date: 11/13/96
Unit: RW(M) 1

Inventory v. LAMS: 52.4%
Inventory v. SERMIS: 52.4%
LAMS v.SERMIS: 95%
Readiness (Unscrubbed-MC): 73.6

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
4	MBEU8463/Gun Mounting	2	2	2/2	0	0	0
16	74D110054-1001/Windshield	5	5	5/2	0	0	0
43	MBEU65843/Wrench Spa	2	2	2/2	0	0	0
94	T-71897/Installation	3	3	3/1	0	0	0
124	MBEU-143158/Pitot Stat	6	6	6/2	0	0	0
149	MBEU-143095/Seat Buckle	5	5	5/2	0	0	0
201	21C8066G01/Hose Agb	1	0	1/1	0	d	d
220	21C8524G01/Tester Fa	1	1	1/1	0	0	0
232	178AS310/Adapter Assy	10	10	10/4	0	0	0
235	MK001/Maint Kit	1	1	1/1	0	0	0
260	178AS1320/Adapter, T	6	7	7/4	d	e	e
265	74D740001-1001/Cover Ante	21	20	21/6	0	d	d
274	76377/Case Optic	2	2	2/1	0	0	0
280	1328AS525 & 74D750020-1001/Adapter, T	4	5	4/4	0	e	e
326	157AS720/Cable Assy	5	7	5/2	0	e	e
350	57L414/Kit, Hydraulic	5	6	5/2	0	e	e
365	X55C9332/Wrench-F	6	5	6/2	0	d	d
392	01GA000-1 & 208000/Adapter Assy	5	5	5/2	0	0	0
412	HT900/Heating Tool	3	2	3/1	0	d	d
458	1517500/Tool Inse	1	0	1/1	0	d	d
473	MILB15262/Table Work	3	4	3/5	0	e	e
				Matches	20	11	11
				Deficits	1	5	5
				Excesses	0	5	5
				% Validity	95%	52.4%	52.4%

Date: 11/13/96
Unit: FW(M) 2

Inventory v. LAMS: 80%
Inventory v.SERMIS: 80%
LAMS v.SERMIS: 90%
Readiness (Unscrubbed-MC): 80.8%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
5	MBEU1321/Extractor	2	1	1/2	d	d	0
8	MDE321450-1/Adapt, Stic	1	1	1/1	0	0	0
15	74D110054-1001/Windshield	1	1	1/2	0	0	0
42	74D420031-1001/Adapter, GE	1	1	1/1	0	0	0
106	74D130035-1001/Adapter,Ja	1	1	1/1	0	0	0
111	T-71897/Installation	1	1	1/1	0	0	0
114	74D460019-1001/Tool Set,I	1	1	1/1	0	0	0
135	74D130043-1001/Tool Comp	1	1	1/1	0	0	0
139	74D750005-1005/Lock Cont	4	4	4/4	0	0	0
142	3155AS100-1/Horizontal	1	1	1/1	0	0	0
215	178AS310/Adapter As	5	6	5/4	0	e	e
237	74D420030-1001/Control P	2	3	2/3	0	e	e
253	74D750067-1001/Test Adapter	3	4	3/4	0	e	e
259	72P100028-1001/Test Set-S	2	2	2/2	0	0	0
314	P-7008-D/Handle	2	2	2/2	0	0	0
331	57L414/Kit,Hydrau	3	3	3/0	0	0	0
346	55C9332/Wrench-F	2	2	2/2	0	0	0
350	XMA101/Penetrant	1	1	2/2	d	0	d
383	112AS100-5/Jack A/C	1	1	1/3	0	0	0
399	G10369/Bar Code Reader	1	1	1/0	0	0	0
				Matches	18	16	16
				Deficits	2	1	1
				Excesses	0	3	3
				% Validity	90%	80%	80%

Date: 11/13/96
Unit: FW(M) 3

Inventory v. LAMS: 71.4%
Inventory v.SERMIS: 61.9%
LAMS v.SERMIS: 90.5%
Readiness (Unscrubbed-MC): 79.7%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
325	1574AS1720/Cable Assy	1	1	2/2	d	0	d
295	1574AS700/Adapter Assy	1	1	1/2	0	0	0
127	178AS910/Stray Volt	1	1	1/1	0	0	0
432	218-00214-1/Power Unit	1	1	1/0	0	0	0
192	21C8027G01/pin, Rigging	2	1	2/2	0	d	d
316	3308AS100-1/Tool Set, W	1	1	1/1	0	0	0
364	55C9332/Wrench-F	2	2	2/2	0	0	0
349	57L414/Kit Hydraulic	2	4	2/2	0	e	e
459	58A164D823/Tool, Remove	1	1	1/1	0	0	0
386	630AS100-11/Fluid Service	2	2	3/2	d	0	d
188	74D130042-1001/Cable Assy	1	1	1/1	0	0	0
144	74D290109-1005/Screen, Inlet	2	2	2/3	0	0	0
20	74D460001-1001/Cap, Prote	1	1	1/1	0	0	0
116	74D460020-1003/Adapter, SE	1	1	1/1	0	0	0
293	E10-13947/Tester, BO	1	1	1/1	0	0	0
151	MBEU-143430/Adapter Ba	1	0	1/1	0	d	d
476	MIL-T-15262/Table Work	1	1	1/1	0	0	0
472	MILB15262/Table, Work	2	2	2/5	0	0	0
473	Minimark 5000/Stamping Machine	3	0	3/1	0	d	d
489	SP548005-103/Tool, Fin	5	6	5/5	0	e	e
66	T71554/Compressor	1	2	1/1	0	e	e
				Matches	19	15	13
				Deficits	2	3	5
				Excesses	0	3	3
				% Validity	90.5%	71.4%	61.9%

Date: 11/14/96
Unit: IMA(M) B

Inventory v. LAMS: 61.9%
Inventory v.SERMIS: 42.9%
LAMS v.SERMIS: 66.7%
Readiness (Unscrubbed-MC): 83.8%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
271	21C7445G01/Hose, Preservat	2	2	2/2	0	0	0
527	39287-2/Adapter Set, Com	2	0	2/2	0	d	d
506	512L228/Alignment Kit	4	6	3/3	d	e	e
823	6154/Borescope-rigid	2	6	0/28	d	e	e
692	62A114-D1/Test Set, Elec	2	2	4/7	d	0	d
519	90790/Fixture Mountin	2	2	2/2	0	0	0
574	AN/URM-90/Bridge, Capacita	6	6	6/2	0	0	0
411	CPWA30122/Grinder, Turbine	3	0	3/3	0	d	d
744	1000-0000/Test Set, Tacan	20	20	21/22	d	0	d
1177	1522AS100-1/Shelter, Nonexp	5	5	4/58	d	0	e
881	61A91D101/Indicator, Rate	16	16	16/16	0	0	0
814	540B/Detector, Leak	7	8	7/12	0	e	e
593	864200-40/Induction	1	1	1/1	0	0	0
132	T101369/Support-Sissor	11	11	9/6	d	0	e
390	CPWA30648/Socket, Special	3	2	3/2	0	d	d
185	21C7432G01/Adapter, Waterw	1	0	1/1	0	d	d
1034	00S256-5/Sewing Machine	1	0	1/1	0	d	d
264	21C7259G01/Puller Duplex	2	2	2/2	0	0	0
878	64A17C104/Gauge, Snubber	2	2	2/2	0	0	0
1043	66A91J001/Test Stand, Hydr	1	1	1/1	0	0	0
1022	AT520JK/Machine Swaging	2	2	2/1	d	0	0
				Matches	14	13	9
				Deficits	7	5	7
				Excesses	0	3	5
				% Validity	66.7%	61.9%	42.9%

Date: 11/14/96
Unit: RW(M) 1

Inventory v. LAMS: 78.9%
Inventory v.SERMIS: 57.9%
LAMS v.SERMIS: 78.9%
Readiness (Unscrubbed-MC): 86.4%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
422	M-75-A/Stamping Machine	1	1	1/2	0	0	0
86	PD2659/Socket,Nylon	1	1	2/2	e	0	d
181	PWC30046-61/Puller Oil Seal	1	1	2/2	e	0	d
231	RD-608/ASH37/Recorder-Reprod	1	1	1/1	0	0	0
86	Sim-403/Socket, Pylon	1	1	2/2	e	0	d
99	T101402/Link, Grip Posit	7	7	5/6	d	0	e
102	T101440 & -11 & UST101440/Transmission, LE	13	14	13/8	0	e	e
78	T101630/Hydraulic Manif	2	3	2/2	0	e	e
217	10189975/Cable Assy	2	3	2/2	0	0	0
268	15699-0001/Adapter	4	4	4/4	0	0	0
226	39287-2/Adapter Set, Com	2	2	2/1	0	0	0
308	57L414/Kit, Hydraulic	2	2	2/2	0	0	0
329	630AS100-11/Fluid Service U	2	3	2/3	0	e	e
249	804000-3984-4/Wrench Spanner	12	12	12/6	0	0	0
294	HT-900/Heating Tool Kit	4	4	4/3	0	0	0
61	T101633-101/Adapter, MainR	4	5	4/3	0	e	e
38	T101639-101/Alignment Plate	2	2	2/1	0	0	0
10	T101980/Plate Set, Hold	2	2	2/2	0	0	0
2	T101997/Puller Mechanic	1	1	1/1	0	0	0
				Matches	15	15	11
				Deficits	1	0	3
				Excesses	3	4	5
				% Validity	78.9%	78.9%	57.9%

Date: 11/14/96
Unit: RW(M) 2

Inventory v. LAMS: 65%
Inventory v.SERMIS: 25%
LAMS v.SERMIS: 50%
Readiness (Unscrubbed-MC): 86.8%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
280	178AS300/Adapter, Test	7	5	7/4	0	d	d
162	21C7019G01/Guide Assy	3	3	3/2	0	0	0
173	CPWA30675/Drift Centrifug	2	3	2/2	0	e	e
177	CPWA30705/Adapter-Reduc	7	7	5/4	e	0	e
166	CPWA30869/Cover-Carrier	7	7	5/4	e	0	e
91	T101579/Alignment Tool	4	5	3/2	d	e	e
61	T101633-101/Adapter, MainR	8	8	6/4	e	0	e
25	T102037/Wrench, Main Ro	4	4	3/2	e	0	e
145	T103169/Puller Jet Assy	3	3	2/2	e	0	e
217	10189975/Cable Assy	2	3	2/2	0	e	e
365	2605087/Tester Guided	3	4	5/4	d	e	d
294	975099/Heating Tool	2	2	2/2	0	0	0
351	G10369/Bar Code Reader	2	2	2/2	0	0	0
262	MK0001/Maint Elec Kit	5	4	5/2	0	d	d
128	T102095/Staking Tool SE	1	1	1/0	0	0	0
268	15699-0001/Adapter	2	2	8/4	d	0	d
161	21C7085G02/Switch Box, Cir	2	2	4/4	d	0	d
327	630AS100-11/Fluid Service Unit	1	0	8/4	d	d	d
61	T101633-101/Adapter, Main R	2	2	6/4	d	0	d
425	Minimark 5000/Stamping Machine	1	1	1/1	0	0	0
				Matches	10	13	5
				Deficits	5	3	7
				Excesses	5	4	8
				% Validity	50%	65%	25%

Date: 11/14/96
Unit: RW(M) 3

Inventory v. LAMS: 55%
Inventory v.SERMIS: 60%
LAMS v.SERMIS: 80%
Readiness (Unscrubbed-MC): 78.3%

Line Number	Part Number/Nomenclature	LAMS Qty	Inventory Quantity	SERMIS Qty OH/Auth	LAMS v. SERMIS	Inventory v. LAMS	Inventory v. SERMIS
362	3077AS100-1/Adapter, Turret	2	2	2/2	0	0	0
303	39565/Test Set, Stab.C	7	7	7/2	0	0	0
393	5077200/Gage Plug	2	0	2/4	0	d	d
398	7790352/Extractor-Rupru	5	5	5/4	0	0	0
407	8587581/Boresight,Opti	11	11	11/11	0	0	0
425	A53/Stamping Machine	1	0	1/1	0	d	d
1	DB3225L/Drain Line	1	2	2/2	e	e	0
3	T101910/Ring Seal, Instal	8	8	8/2	0	0	0
178	CPWA30749B/Cover-Exhaust	4	4	4/4	0	0	0
231	RD-608/ASH37/ Recorder-Reprod	2	2	2/2	0	0	0
105	T101468/Stop Flap	1	1	11/4	e	0	d
61	T101633-101/Adapter Main R	3	7	3/4	0	e	e
19	T103057/Tab Bending	3	3	3/4	0	0	0
12	T101924/Plate Support	1	1	1/2	0	0	0
4	T101996/Blade, Bolt Dri	5	5	5/2	0	0	0
277	178AS1700/Charger Set, Br	7	6	6/2	d	d	0
238	3101AS100/Tool Set Wiring	2	3	2/2	0	e	e
108	4213/Adapter, Vibrex	4	3	4/4	0	d	d
47	5563606-2/Tool, Engine Ri	3	0	5/2	e	d	d
14	T101972/Hold Plate	3	2	3/2	0	d	d
				Matches	16	11	12
				Deficits	1	6	6
				Excesses	3	3	2
				% Validity	80%	55%	60%

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center 2
   8725 John J. Kingman Rd., STE 0944
   Ft. Belvoir, Virginia 22060-6218

2. Dudley Knox Library 2
   Naval Postgraduate School
   411 Dyer Rd.
   Monterey, California 93943-5101

3. Director, Training and Education 2
   MCCDC, Code C46
   1019 Elliot Rd.
   Quantico, Virginia 22134-5027

4. Director, Marine Corps Research Center 2
   MCCDC, Code C40RC
   2040 Broadway Street
   Quantico, Virginia 22134-5107

5. Director, Studies and Analysis Division 1
   MCCDC, Code C45
   300 Russell Road
   Quantico, Virginia 22134-5130

6. Defense Logistics Studies Exchange 1
   U.S. Army Logistics Management College
   Fort Lee, Virginia 23801-6043

7. Major Frank McCallister USMC 1
   1544 Merion Lane
   Oakmont, Pennsylvania 15139

8. Major Joyce McCallister USMC 1
   1544 Merion Lane
   Oakmont, Pennsylvania 15139

9. Captain Robert Pridgen USMC 1
   1737 Carolina Drive
   Aiken, South Carolina 29801

10. Rear Admiral Donald R. Eaton USN (Ret.) (Code SM/ET) 1
Naval Postgraduate School
Monterey, California 93940-5103

11. Captain Gordon Nakagawa USN (Ret.) (Code OA/GN) 1
Naval Postgraduate School
Monterey, California 93940-5103

12. Professor James G. Taylor (Code OA/JT) 1
Naval Postgraduate School
Monterey, California 93940-5103

13. Professor David L. Lamm (Code SM/DL) 1
Naval Postgraduate School
Monterey, California 93940-5103

14. Commander, Naval Air Systems Command (Code PMA-260) 4
Captain Jerry Derrick USN
Naval Air Systems Command Headquarters
1421 Jefferson Davis Highway
Arlington, Virginia 22243

15. Commander, Naval Air Forces, Pacific (Code N422B2) 1
Ms. Sue Eckberg
Bldg. 10 Rm. 205
Box 357051
San Diego, California 92135-7051

16. Headquarters Marine Corps (Code ASL) 1
Col Richard Hobbs
2 Navy Annex
Washington, District of Columbia
20380-1775

17. Naval Air Warfare Center Aircraft Division (Code 11X700B) 2
Bldg. 562, Highway 547
NAWC, Lakehurst, N.J. 08733